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A critical examination of progress at government level since 1980—the UK situation

John Osborn

Member of Parliament

Paper presented at the fifty-fourth Aslib Annual Conference, University of Oxford, 22–25 September 1981

Introduction

TO BE INVITED to set the theme for this Conference—'Information 81, Forecasts and Realities'—I have been asked to make a critical examination of progress at Government level over the past 12 months. To be invited to set a theme is both a privilege and a responsibility, the extent of which only dawned on me last month when I attempted to collate my thoughts on the role of Government in this whole field of librarianship.

My aim must be to describe to you the scene as I see it—and I accept it is a rapidly changing one—when looked at from the 'fringe' of Government. I wish to cover eight areas. Initially my approach is a personal one and I believe that it is necessary to understand what has happened over recent decades if one is to forecast what will happen by the turn of the century. Secondly, I want to talk about the role of Parliament in the field of science technology and the growing influences of Parliamentarians in an age of growing professionalism in politics. Thirdly, I want to dwell on some philosophical as well as political issues as after all this is what politics is about and this leads on to my fourth set of observations namely those concerning the political and financial cross currents in which librarianship and information technology must learn to survive if not prosper. Fifthly, I wish to touch on the changes in the technology of librarianship including information technology, but I am well aware that this is a better theme for experts rather than politicians. Next, I want to be a little more practical and dwell on United States experience for striking a balance between Government and free enterprise in the hope that Great Britain can learn from this and then make reference to Ministerial changes. Finally I want to finish with conclusions that I hope will be of help today.

Firstly I wish to look backwards, before looking forwards. What exactly is government? Anyone who has watched the TV series 'Yes Minister' even if he did not know the realities already, will have learned by now that there is some doubt in some minds, anyhow in the field of day to day administration, whether it is a Minister who runs his department or whether in some concealed and secretive way the permanent secretary and the civil service.

In the Office of Arts and Libraries there is regardless of Minister, or Government

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in power for that matter, a common interest which leads to an understanding and mutual respect—I am certain that this exists in the case of the present minister for Arts and Libraries, Mr Paul Channon.

In this field of librarianship and information technology anyhow in so far as this country is concerned, and I don't speak of other countries where there are similar problems, those attending this conference would be entitled to ask which Minister? and which Government Department? My private discussions with Government tell me of Cabinet Committees and inter-departmental Committees. Inevitably what they achieve or do in this field is never made known to the outsider. My aim this morning therefore is to chart a course as it were and like Ulysses to carefully steer between Scylla and Charybdis.

If then the transcript of my contribution today is read either ten years hence, or twenty years hence, it is now interesting to contemplate whether the course I chart will be as near making port as I achieved on crossing the channel some twenty years ago. If so, I believe any comment about 'believing in miracles' will be an equally fair one.

In the field of information technology, informatics, telematics and librarianship, I have in fact had an ongoing interest which might make the course I choose to chart too dependant on subjective judgement. But I can claim an interest of some 40 years; this is why I want to spend more time reviewing what has happened.

In fact it was in the autumn of 1941, 40 years ago, that I went to that other University to read natural sciences. In my second year I was under the Goldsmith Professor of Metallurgy, Professor R. S. Hutton, who drew my attention to the information explosion and the problem of easy and instant access to the wealth of knowledge which he considered even then to be multiplying at a too rapid rate. He was particularly concerned about this in the field of natural sciences in which he was mainly interested. Subsequently I entered Parliament and in the early 1960's he and I were members of the steering committee of the Parliamentary Scientific Committee as well as being officers of that Committee. He was enthusiastic about the concept of a national library of science and technology on the South Bank, but for a variety of reasons, which are well known, this never materialised at the time. As an aside, what scientists will have to consider will be the rising cost of R and D, or the work it involves, in decades. Cost-effectiveness of R and D demands a much greater awareness of work done, and existing knowledge, before any R and D programme is contemplated.

Some twenty years ago, as an industrialist and with some knowledge of the problem, I was amazed at the extent to which the then industrial leaders were content with the inadequate and out of date information on the frontiers of science and technology with which they were supplied and particularly so in my specialist fields of special steels, new materials and precision foundries, which were in fact my specific industrial interest at that time. After all the science of information—to put it crudely, knowledge and information about knowledge in the scientific and technological fields, was then but in its infancy.

To prepare this contribution, I did not use video screens, printed handouts and information contributed by the modern mechanisms of informatics and telematics to help me collate my thoughts, as I had suspected would be the case. I suspect that for a long time there will be room for scholarship, study and appraisal based on human experience using conventional sources of information before all this will be taken over by the data bank, random access and 'real time' computerised links.

Last year a retiring Secretary of the Parliamentary and Scientific Committee Commander Christopher Powell and the present Secretary, Mr Arthur Butler, wrote a history of the committee and its first 40 years since its foundation at the beginning of World War II. One of the aims of this Committee throughout this time has been to arrange for Peers and Members of the House of Commons to discuss together with the appropriate experts, matters of topical interest in the scientific and technological field.

In the mid 1960's such a topical field gave rise to a sub-committee which I had the privilege of chairing. Its members included Leslie Wilson of Aslib, Dr Gainsbrough of the Institute of Electrical Engineers and Lord Ironside who throughout his life has had active interest in both the industrial and scientific fields.

Our main concern was that of information storage and retrieval in the scientific and technological fields and I am well aware that the work of this Committee did not embrace librarianship in the widest fields, which is of course also concerned with the arts, literature and the humanities. Perhaps the greatest achievement of the Parliamentary and Scientific Committee at that time was to interest Governments, Ministers and Shadow Ministers in a problem that appeared to have a wide variety of solutions.

One minister who gained a sensitive understanding of the opportunities, contradictions and imponderables was Lord Eccles, and in my personal view it has been Lord Eccles who has done as much as anyone to bring about the situation covered in the statement by the Chancellor of the Duchy of Lancaster, Norman St John Stevas, who on Friday 28 November 1980 announced that he had completed his review of the library Euston Road Building project and that he was pleased to be able to say that he had decided to make a start on the scheme.

But the provision of information for members of Parliament has been a matter of international concern increasingly over the last decade and I have been involved in meetings with the Inter-Parliamentary Union about the provision of such information for elected representatives including a conference in Geneva in 1973. The Director of the Congressional Research, Washington, Mr Lester Jason had done much to explain to parliamentarians throughout the world the nature of the highly efficient backup available to senators and members of the House of Representatives in Washington, USA.

But turning back to this Geneva Conference it was fortunately not a luckless British Civil Servant in an audience predominantly of Members of Parliament who was misguided enough to state in connection with the libraries, that Governments may come and go, Ministers may come and go, Members of Parliament may come and may go, but we in the civil service go on for ever.

Two other aspects of the development of the last two decades have been (a) the realisation that information and knowledge are international and exchangeable and (b) that Government departments as well as international government organisations and agencies, possess an immense amount of highly specialised information that need not necessarily be classified and could be available readily, not only to Members of Parliament through parliamentary libraries, but the people and the press of their respective countries. There is an immense range of financial, statistical and general information about health, trade, employment and industry held by government departments.

It was a Council of Europe Science and Technology sub committee of which I was Chairman in the mid 1970's, which had a most useful hearing in London in 1974 and which made Governments and Parliaments of some 23 countries in Europe, better aware of what was already becoming obvious to those most interested in this country.

The House of Commons Library under a Central Computer and Telecommunications Agency contract is bringing in a parliamentary information indexing system called POLIS, with Scicon Computer Services Limited. It has a database covering parliamentary questions, proceedings, papers, the progress of UK and European legislation, official publications and a variety of other official documents. It will eventually have a Thesaurus Service and an Online Service accessible from outside. I am not going to dwell at this stage too extensively on the Davignon initiative in the field of informatics and telematics as this will be the subject of a later paper but what has happened within the EEC has not only been of interest to members of the European Parliament which I was a member of between 1975 and 1979, but to Ministers through the Council of Ministers and the Commission. This has been the background for Euronet Diane and the translation facilities which were the subject of an excellent report under a House of Lords sub-committee whose Chairman was Lord Sherfield.

This Committee felt it was essential to have a strong and competitive information technology industry in the EEC and that the present fragmented structure should be improved. However, it was also noted that there was a shortage of resources in terms of staff and funds which was hampering the Commission's initiatives. There was a need, according to the Committee, for Inf. Technology developments to depend on private sector investment as well as on support from Member States.

The Committee also underlined the essential requirement of a substantially free machine translation system. Most importantly the Committee resolved that the Commission as well as Member States, should increase their existing use of Information Technology equipment in their own services wherever possible.

Some form of supervision and rationalised structure should be applied to information technology development in Europe, and Governmental contributions in this field should not be under played. Government is clearly vital as a major purchaser of information technology material. Lord Gowrie in the debate of this report, made some interesting statements which of course I will wish to refer to later on.

One of the objects of my observation so far has been to outline the background to my subjective as well as objective attitudes to the theme of this Conference 'Information '81: Forecasts and Realities' and my difficulty in making forecasts in so far as Government is concerned. Another deliberate object of my contribution so far has been to introduce the importance of Parliament in an age when governments acquire greater influence and power. A corresponding increase in the power of parliament is essential if democracy is to survive.

The role of parliament

This summer there was held in Helsinki the fifth Parliamentary and Scientific

Conference co-ordinated by the Science and Technology Committee of the Council of Europe. The theme was Technological Change and Parliamentary Democracy and it was my task to consider how to 'Revitalise the links between the Parliament and Scientific Communities'. The areas chosen by the organizing committee as being of major political importance and consequence at the present time, were considered to be biotechnology, energy and the microchip and its implications. They provide good examples of the need for the peoples of a country or nation to understand the implications of key issues such as these, and the need for Members of Parliament, or at least some Members of Parliament, to understand the reactions of people affected by government decisions in these fields, as well as the concensus of advice from experts.

In the paper I gave, I was able to outline how in Great Britain the Parliamentary and Scientific Committee was instrumental in bringing about the first Science and Technology Select Committee of the House of Commons and of its involvement through a Select Committee of Procedure in the decision that Select Committees should monitor government departments as such and the appropriate ministers in those departments. This change has barely been operating for two years.

I then spoke about the creation of a Select Committee for Education, Science and the Arts of which I am a member, and one of the first subjects this Committee tackled was that of information storage and retrieval in the British Library service, a report which was ordered to be printed on the 31st July 1980, HC767, a subject which I considered useful for a new Select Committee dealing with Arts & Science, as well as education, to cut its teeth on. The main recommendations of this Committee were not available for the Conference held in Sheffield last year. My main task today must be to elaborate on what Governments have done since the report was published in October. I have assumed that the second and fourth reports of this Select Committee are known to those who are here today, and that they have had sight of the two replies from Government, but of course I shall be happy to answer questions on these in due course.

I would make two observations—the then Junior Arts Minister, Mr Neil McFarlane, made a contribution at last year's conference outlining the Government's intentions at that time in response to a report from the Library Advisory Council. He stressed that the Office of Arts and Libraries was keenly aware of the increasing importance of access to accurate information whether through libraries, information departments or other agencies. He stressed that each new technological development increases the volume and complexity of recorded knowledge and this in turn pointed the way to further progress. What he said then still applies, namely—'our prosperity, well being and the whole quality of our lives depends on this vital commodity.'

These very issues had been brought to the attention of the Select Committee of Education, Science and the Arts, and published in the appendices of their report. Secondly, at a separate meeting of librarians at the time of the Conference in Sheffield last year, the Chairman of the Select Committee for Education, Science and the Arts, Christopher Price, expressed a number of views which were, I understand, reflected in an article he published in the *Times* in November of last year.

There are differences between members in the Select Committee. To me the information technology road is not clear cut. Progress must be by concensus amongst experts with different views and even opposing concepts. Frankly, I am relieved that there is no clear cut authoritarian policy from Government today, and I will try and give some of my reasons for this.

Philosophical and political issues

Civil servants worldwide are concerned about their own budgets, for their own departments—I would define this as a form of empire building. Therefore they will encourage national activity instead of international activity in many fields of science and technology. This has showed itself in the preparation of a new convention for euro control and a reversion to national control. The whole question of the space lab as part of the shuttle and the 'European Space Agency', let alone that of nuclear fusion (and there is an important development at Culham) all pose the question as to how much coordinated international activity should show itself in the form of projects and associations such as I have outlined.

The Euronet Diane concept is a community concept and international, but I forecast that the funding of Euronet Diane, let alone satellite links for other than commercial purposes, where payment is made as and when a service is used, will provide international challenges and increasing problems to the finance ministers of individual countries.

A philosophical and objective scientific appreciation of the problem of the level of public expenditure and the level of taxation to meet this, present all nations, especially western nations, with a challenge. There is no escaping the fact, and I am aware I am being political, as a Conservative Member of Parliament, when I raise this—that over the four decades since the Parliamentary and Scientific Committee was formed, society has asked Governments to do more and more until the burden of this is such that the Government have commitments for operations and even their surveillance far beyond their capacity to carry them out let alone pay for them.

The political and financial cross currents of librarianship and information technology

The cost of all library services in this country is in the order of £550 million, a figure given to the Select Committee in evidence and if not verified by Government, certainly not strongly challenged. For decades there has been no challenge to the concept that public libraries should be free. There are many who believe that scholarship and knowledge know no barriers, but I have read to an increasing extent and had drawn to my attention, the whole question of copyright, patents and even the work of the Select Committee of Education, Science and the Arts, had to touch on this. This is a subject which does not rest with the Minister for the Arts, but primarily with the Secretary of State for Trade. In July there was published a Green Paper Command 8302, Reform of the Law relating to Copyright, Designs and Performers Protection.

Firstly, there is the question of copyright of and protection of computer programmes and acceptance that they go under various transformations. For example, translation from human readable 'source code' to machine readable digital 'object code' and vice versa; there is the whole question of computer use of copyright material and the existence of the VDU (Visual Display Unit). This Green paper follows a thorough review of copyright law carried out by the Whitford Committee, which reported in 1977. This was certainly an issue which was raised with those members of the Select Committee who were in Luxembourg last year; it concerns the EEC and is international. The Select Committee were also made aware that the problems in relations between publishers and libraries present problems and that this does not stop at the use of photocopying of material whether it be copyright or not.

Already Government will have to strike a balance between on the one hand material being made available for all to see, use and absorb free of charge, and on the other preserving the copyright and rights to revenue to those who exercise artistic or literary skill in this field in their capacity as authors or performers. But knowledge, particularly to those active in wealth creating industry, new technologies, new science and let alone general wealth creating industry, is money. A small example of this fact is that many a Company will hire and put on to their payroll a genius in the hope that he will innovate, make new discoveries and put them to worthwhile wealth creating, money making and profitable activity. These activities not only provide employment within a community but meet the needs of a consumer and can be rewarding to those who back them by providing a profitable return on capital.

Surely information technology will mean that the rather vague existing borderline will have to be redrawn. Those who work closely with the USA have been impressed by the speed of the information and telematics revolution that has hit commerce and business and by the extent to which businesses will pay for information of every variety if this can be provided quickly.

Computer software houses in Great Britain, and for that matter throughout the EEC, let alone the USA find that filling the interface between the source of knowledge and the person who uses it, to be an activity which is self financing. Why therefore, particularly under a Conservative Government should state sponsored quangos, government agencies and the public services take on activities at the expense of the tax payer, which could in a free world and in a free market be marketed, reward those that undertook them and be paid for without resource to the public purse?

The contrast in attitudes in these fields, between the USA and Canada on the one hand, and Great Britain and EEC countries on the other, cannot be evaded at this particular time, and at a time when a Conservative Government is endeavouring to cut back or streamline national expenditure.

Assuming the cost of library services is £550 million, and I believe Great Britain will have a better idea of the cost of these services to the nation than any other country, will not the challenge be to determine priorities to give better value for money within this field of public expenditure, irrespective of whether or not it should be a bigger percentage of the whole. Surely this means a willingness to cut back, cut out and cut down, in order to reserve funds for developing the new? If this is true for the public services today, in public sector and private industry to a greater extent is it not of equal importance and a challenge in the field that is the subject of this conference.

A change in technology

Librarianship in Great Britain, if not most countries of the world, is directly or indirectly financed and operated by governments and the state (and as far as Great Britain is concerned, I include Local Authorities). This has been a matter of concern for a number of Committees and groups in Government and between Governments over the past decade.

If the first step in communicating knowledge was the discovery of papyrus and the quill, the second contributed by Caxton and the development of the printing press, the third phase which has only just reached us is undoubtedly that of the computer, memory and data bank and a whole host of new technologies including video, and communications satellites. If today there are more people reading and buying books society has to face up to the fact that libraries are in danger of becoming 'museums of literature' and there is a limit to the extent Governments, whether nationally or regionally, can agree to conserve an out of date technology.

Nevertheless, the Select Committee in its consideration of the British Library and New Technology looked at the need for an information network, and coordination of its development and technological trends and envisaged a future in which information particularly in science, technology, industry and commerce would be increasingly in electronic form. It visualized that the stores could well be provided by publishers or data based processors such as those who at present store bibliographical records and pointed out that from these hosts it would be possible to request individual texts for an electronic transmission to terminals located in libraries, offices or homes. But we also stated in paragraph 40 'we see this development as supplementing but not replacing conventional library services'. Since the report I have had drawn to my attention the British Library Report No. 5626—a Study of the Scientific Information System in the United Kingdom—published by the Royal Society in 1981.

Secondly, there has been the report of the Advisory Council Research and Development under the Chairmanship of Sir Robert Clayton, and the Government have yet to give their observations on this although it can be said they have taken certain actions as a result of this report. This report made some interesting recommendations, and reiterated that one Minister and government department should be responsible for the coordination of Government policies and actions on the promotion and development of IT and its applications through awareness, education and training, sponsorship of industry, provision risk capital, public purchasing, publicity funded R. & D., national and international regulations and standards, legislation, communications and related programmes such as satellite technology. The concluding remarks were to the effect that Government, industry, trade unions, commerce and the professions must take the new developments in information very seriously. They will affect working arrangements, management systems and personal life. The Civil Service, local government and industrial and commercial management are frequently aware of the systems which are available, but are sometimes slow in adjusting their method of working to make effective use of them. The successful exploitation of IT is crucial to high employment, a satisfactory balance of trade, competitive industry and an efficient commercial sector.

Thirdly, it seems that the Government and Industry are to collaborate on information technology as a result of a series of initiatives by a newly reconstituted Electronics, Economic Development Committee (E.D.C.). The Committee has been set up and is to be led by Sir Henry Chilver, Vice Chancellor of Cranfield Institute of Technology and they are convinced that Britain can learn from the policies of its competitot nations.

Fourthly, I have already mentioned in this paper the delicate relationship between the British Parliament and its Select Committees, Government and the balance of powers between Ministers and permanent civil servants. A paper was given by Sir Peter Carey KCB Permanent Secretary, Dept. of Industry, to the Royal Society for the Encouragement of Arts Manufacturers and Commerce in February. He is attracted to a simple story, a story of Rothschild and the Battle of Waterloo. Rothschilds were the first in London to receive news of the result of the battle of Waterloo because they had arranged for the news to be carried by the then swiftest and most secure means of communication—a carrier pigeon. They were therefore in possession of vital information 24 hours in advance of the market. There is a second and more interesting moral to be drawn from the story—Rothschild sold stock when he heard the news, thereby inducing prices to fall and then bought stock at the lowest prices before the inevitable rise when the good news broke. Sir Peter concluded that having the technology is only half the story; being able to use the information you are given to the best advantage is the second and perhaps most important point.

Later in that paper he stressed that the Dept. of Industry has been identified as the focal point for information technology and stressed 'that the Government recognizes that it has a central and positive role to play in the effective development and application of information technology which is crucial to the future commercial and industrial success of the United Kingdom. However, it has no intention of usurping those functions which can more efficiently be discharged by private enterprise. It follows therefore than an important objective for the Government in the field of information technology as in other areas, is to create the general economic condition in which private initiative can prosper and private venture be suitably rewarded without excessive Government intervention.

Government v free enterprise

United States experience

Over the past two years as a Conservative Member of Parliament, I have been conscious of a clear message that economic realism has to be faced by all nations. So far, the provision of information, let alone libraries where the student and those attempting to learn can browse, have probably escaped the scrutiny that is prevalent in other spheres of economic activity. I remember it was John Peyton during the debates when the steel industry was nationalized, who quoted on more than one occasion, and this was in 1966, that 'all Governments are incompetent including Conservative Governments, so the less they are given to do the better', and during the past two decades I have had the privilege on a number of occasions of discussing with Soviet academicians the problem of intensive planning and my impression is that the results, as far as the consumer is concerned, have far from been the success those planners had hoped to achieve.

If the state is too involved when it is short of funds, there must be economies, but if the whole field of communications computers, software, the microchip and other new technologies are expanding at phenomenal rates, as a business activity and certainly my contacts with the Association of Data Producers have confirmed this, then the strictures of Sir Peter Carey, a permanent official, have their relevance.

These problems have to be looked at very carefully in the United States of America which the Select Committee visited both this year and last year, and I have had the privilege of maintaining contact with the Library of Congress who have been concerned with the ownership and distribution of bibliographical data. Individual libraries there are concerned about the options available to them for preparing, sharing and gaining access to machine readable records. These concerns are as a result of the continued growth of the bibliographical utilities and their success in establishing and servicing large files of machine readable bibliographical records.

The growth and success of the commercial bibliographical services and data based vendors have resulted in similar concerns in the 'for profit' sector, thus in the U.S.A. there is a relationship for which precedents and ground rules do not exist and there is a growing realization there that the relationship between a library and a bibliographic utility is not one between a customer and a vendor, but more of a partnership, and in an area of expanding free enterprise this is obviously creating considerable problems.

Similarly, when it comes to a nationwide network, one of the scenarios they have had to look at is that of a network coming from activity in the private sector in which 'for profit' and 'not for profit' entities will create a nationwide network within the context of restrictions of opportunities in the market place.

Ministerial changes

The Select Committee recommended that as soon as possible the Government appoint a Minister of Cabinet rank to take responsibility for information policy and provide him with the necessary staff.

It is therefore necessary to deal with three of these signposts at one time; the appointment of Paul Channon as Minister with responsibilities for the Arts and Libraries, secondly the appointment of Kenneth Baker as Minister of State with responsibility for information technology at the Department of Industry and thirdly, the reply to a Select Committee report by the Minister for the Arts which was issued in April 1981 and was to the effect that—(1) the term information policy is very wide and has no precise definition—(2) the Government intend to follow as far as practical the principle running through the Select Committee's report that libraries and information services should be regarded as a single area of concern. There is stress that a number of departments are involved including the Dept. of Industry and the Minister for the Arts. The Government hold the view that any national policy on information services must be of a very general and flexible kind allowing the maximum freedom to individual departments to maintain and develop services and particularly groups of users in the most appropriate way and in the light of a close knowledge of users needs and information resources available.

With regard to the appointment of Kenneth Baker who has responsibility for information technology, there is no doubt that he is an enthusiastic person and that over recent months he has persuaded the Prime Minister that this is a new growth area which has great prospects for private industry. He has made a number of major speeches on this but he holds the view that—it is not what the Government is going to do, it is what industry is going to do which is of so much importance.

On the 6 August it was learned that the Library Advisory Council is to become the Library and Information Services Council; the new title reflects the current developments of libraries in the context of information services generally, as well as government recognition for the need for coordination through the field of information provision. It states the change implements an undertaking given to the House of Commons Select Committee on Education, Science and the Arts that the title should reflect more fully the range of the Council's functions as announced in April 1981, when I had spoken to Professor Wilfred Saunders who takes over the Chairmanship of this Council. On the other hand, the Select Committee's recommendation to set up a Standing Commission, received the reply from the Government that there was no value in the new body and that the Library Advisory Council was adequate.

There are still questions that the Select Committee will want clarification about. Does in fact this Libraries and Information Services Council cover the range of interests which we had in mind and is it as representative as we envisaged; for instance will it include publishers and data producers?

The Select Committee did discuss textual material becoming available from computers. Already one international consortium has recently been set up to explore the possibility of storing scientific and technical material, and a mechanism for circulating this information electronically. I believe Elsevier, a Dutch publishing Company, is one of the main organizations behind this consortium. Does this therefore mean that the world is one step nearer having a proportion of the world's literature being stored electronically with an 'on-demand' provision?

Conclusions

The British reaction to the initiative of Comm. Davignon of the Commission of the European Economic Community was given by Lord Gowrie in a debate in the House of Lords as recently as the 10 July. He reminded the House of Commons that just this year there has been a bill on Government Proposals that substantially liberalized the Post Office Telecommunications monopoly, a most important aspect of communications; the Government has already given £80 million for direct support to information technology and £110 million to the microprocessor applications project.

Secondly, there is now a major awareness campaign being mounted largely due to the appointment of Mr Kenneth Baker and 1982 has been designated information technology year. A decision which I would have thought is of immense importance to those associated with a Conference such as this.

Thirdly, Mr Paul Channon has underwritten the decision of Norman St. John Stevas as a result of the recommendations of the second report of the Select Committee of Education, Science and Arts Select Committee, that the Euston Road Project should go forward.

In business it used to be said within my old industry of steel and engineering, that one should not get into a new process or product first but endeavour to be second or third, so that the pioneers can make all the mistakes. Any visitor to the U.S.A. cannot help but be impressed by the microchip and information technology revolution and the concept of the paperless office. It could be that many fingers will be burned and there will be much confusion before adequate coordination is achieved there.

But I am impressed in terms of the invention of the quill and papyrus, by the fact that I use pen and ink to an immense extent, I am impressed by the extent to which a publishing trade still uses the printing press thanks to Caxton, and therefore I am convinced that the conventional library will not disappear overnight, but it is an old and well established concept which must be brought up to date to work in harness with these new technologies.

The computer, the database, other than drawing my attention to references has done little to collate the thoughts I have brought together today. The pen, and the printed word, have. It will be the printing press that will record these words for prosperity in the first instance, but could it be that these words will also be stored electronically.

I am convinced therefore the decision to go ahead with the extension of the British Library in Euston Road and that the work of Sir Frederick Dainton and Sir Harry Hookway in coordination with other libraries, must continue. Decisions with regard to this library particularly in an age of new technology have been difficult for Ministers and Governments. I would suggest that Norman St. John Stevas' decision was helped by the fact that the Select Committee urged him to make the decision and go ahead, in spite of a shortage of funds nationally.

As our society becomes more complex, the urgency for up to date information about what is happening on every front and the need to make this available to more and more people, will for ever be prevalent. Government departments, individual departments have this information, which is virtually unclassified, and I believe it should be made more accessible to parliament itself and people interested in these figures throughout the country. Modern technology will make this easier. But the concept of a national library service must include all libraries, including departmental libraries in the Government, libraries of the House of Lords and the House of Commons, the British Library and a whole range of libraries serving different purposes up and down the country. If the importance of this was obvious to me as a Member of the Council of Europe in 1974, this still seems to me a field worthy of closer scrutiny and subsequently action.

I believe all nations will have to look again at what should be paid for, and what should be given as a free service to the user at the expense of the tax payer in the field of information and library services. My aim this morning has been to describe the scene as I see it and I hope that this will prove to be helpful and a positive start to the Conference this year.

Information policies in Western Europe–some remarks about the present situation

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IT SEEMS TO ME that no-one has talked or written about this subject before. In fact, although information is a border-crossing reality there seems to have been little or no border-crossing coordination. And what has been done by international bodies surely can not be counted as an exchange of ideas about national policies. I have quickly added a subtitle, 'some remarks about the present situation' for it cannot be any more than that. I should like to come back to this later, but, as you certainly know, one of the most difficult tasks is to get information on information. Perhaps that is one of the reasons why nobody ventured to take up the subject before. The only real facts I can probably give you on the subject is to tell you that I am not going to be speaking about libraries, archives, and publishers and printers.

Libraries definitely during the past years have increasingly abandoned their role of passive centres and become active in supplying information. On the modern information scene they have been entrusted with a new and important task, namely to be the reliable sources for full text documents referred to in modern information systems.

Information policies at least seem to pay attention to library development in the Western European countries—perhaps with Italy ranking last. But this is by no means to imply that the support given is sufficient. I, however, think the information world would be well off, if the existing support were continued into the years to come despite the budgetary restrictions which will be more painful than in the past.

I shall not speak about archives. They seem to be fairly far away from what is called the information scene and thus they do not seem to play an important role in the I and D programmes in our countries. I wish, however, to underline that not only in the developing countries but also with us there is a rightly increasing awareness of socio-cultural environments as a route to and safeguard of the real quality of life, calling for more attention to the role and support of archival institutions.

The information policies in Western Europe seem to have almost forgotten publishers and printers. We have just learned about the more recent approaches in the U.K., but in general, there is hardly enough found about publishing and printing in the I and D programmes, partly perhaps because governments seem to think, that this

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should be left to private enterprise and therefore not included into state programmes. This attitude could change, however. And the least that can be hoped for is that publishers and printers will be adequately integrated into future information programme sets.

A major question seems to me: is it possible to present hard figures about information policy or policy-like sets in Western Europe at all? I don't honestly think anyone can. Information is more on the software than on the hardware side. But 'soft' does not mean 'smooth' in this case.

When trying to compile facts about such policies you immediately run into the difficulty of definition. Certainly, information policy is not limited to areas like communication, telematics or informatics. I like to look at the definition from the user end and say that information policy should cover everything aiming at the three 'E's':

Experts (S & T)
Economy (Industry)
Everyone

I would like to place science and technology under experts and information for industry under economy hoping that no-one will protest saying that there are experts also in industry and amongst the everyones. Let me also say where one can find information on information policies and their realization, namely: *Nowhere!* Unless, of course, you are an MP, expert in the field, know the government and its working as well as what comes out of it. But if you are not, the only way to get this information is to have some very good friends in all the countries concerned to supply you with what you would neither find in libraries, nor in government archives, nor even on the shelves of learned societies.

But let's see whether there ever was or is such a thing as a central national information policy or at least a set of policies and plans in the various Western European countries. And this is what I found:

TABLE 1. *Is there or was there in the information field the following policy?*

	a national policy?	*a set of policies?*
A		X
B		(X)
D	X	
F		X
I		—
NL		(X)
SCAN		X
UK		X

Federal Republic of Germany

This one mark in the first column will of course interest you. Is it a mark signifying success? The answer—I am sorry to say—is: no. The 'Programme of the Federal Government of Germany for the Promotion of Information and Documentation (I and D Programme) 1974–1977' so far unfortunately has not nearly reached its goal. And even sadder is: nobody any longer believes it ever will.

Under the coordination of the Ministry for Research and Technology an ambitions planning process was launched at the beginning to establish 20 so called Specialized Information Systems. The envisaged 20 systems were to have a more or less centralized operational focus. Here now is some history of what was planned:

TABLE 2. *Originally planned specialized information systems in Germany*

— health services, medicine, biology, sports
— nutrition, agriculture and forestry
— chemistry
— energy, physics, math.
— el. eng., mech. eng.
— metallurgy, materials, metal working
— extractive industries and earth sciences
— transport
— regional planning, building and construction
— consumer goods
— economics
— law
— education
— social sciences
— humanities
— foreign area studies
— environment
— patents
— technical standards
— research information

As you see, the world had been neatly divided into 20 areas. The total costs of running all systems were estimated at 180 Millions of German Marks per year (approx 40 million pounds per year). In reality, only three of the centres are now in operation. All the others, including the one I was meant to build up for 'transportation' will most certainly never be established. What were the reasons for this?

For one thing, the responsible ministry never succeeded in convincing the other ministries of the overriding importance of information and of its ability to handle the matter. Planning was overdone, resulting in enormous needs for personnel and funds just at a time when the budget began tightening up. In the end, the rich became richer and the poor, like the social sciences, therefore perhaps even poorer.

Almost everyone then turned against I & D and the Gesellschaft für Information und Dokumentation (GID), created as an infrastructure body from existing units by the central and state governments, is now struggling hard to save what can be rescued. Meanwhile the Deutsche Gesellschaft für Dokumentation, the learned German society, is trying to pave the way with politicians and decision makers towards convincing the country once more of the necessity to promote information and documentation in the Federal Republic of Germany in a sensible way.

A sad story, even for those who had been warning from the beginning that marching along too ambitious lines would be dangerous. A story now only useful for its lesson to avoid the mistakes of the past.

Italy

As far as I can see, there is only one country where nothing went wrong in Western Europe so far: Italy. If I am not completely mistaken, there is still an absence of any form of information policy in Italy and perhaps this is not so bad as it looks at first glance. There may be reason to wait before a policy is decided about, wait until all possible mistakes have been made elsewhere.

The only official body concerned with information in Italy is the Isituto sulla Ricerca e sulla Documentazione of the Italian National Research Council. No particular government department is concerned with information and no clearing house or centre yet exists. There are connections to EURONET—as practically in all EEC countries—but online users are still few. Only four information brokers work in the country on a commercial basis and training facilities do not yet meet the needs.

Nevertheless, some databases have been internally produced and maybe the example of one of the best known international information retrieval services, IRS, of the European Space Agency (ESA) in Frascati near Rome will convince the responsibles about what will have to be done in the future.

Scandinavia

I take the risk to say, that an analysis of the information policy in the Scandinavian countries is not the most difficult task. The fact, that Denmark, Norway and Sweden had been inhabited by the same Nordic German tribe, Iceland was settled by Norwegian emigrants and Finland happily joined the club, provides a solid basis for successful undertakings in many areas.

This is what the information history looks like in Scandinavia:

TABLE 3. *Information development in Scandinavia*

Scandinavia
- NORDOC (1972)
- SCANNET (NORDFORSC 70'S)
- NORDINFO (1977)
  - — Policy development and coordinating activity
  - — library resources
  - — data bases and network activities
  - — education

In 1972 the Nordic Committee for Information and Documentation (NORDOK) was founded by the Nordic Council which exists since 1952. In 1977 NORDINFO was founded and later took up projects in 4 main areas of work. The Scandinavian Network SCANNET, established in the 70's, now operates about 12 national reference data bases and about 6 fact data bases. SCANNET also is constantly working to facilitate access to international networks and databases.

The following seems to me to be a key heading: 'Coordination of developments in the information field in Scandinavia with the developments in Europe and the United States is as important as the coordination of national systems.' A wise statement indeed, and an issue worth the trouble.

France

Let me then make an attempt to say something about the information policy in France. And let me say outright that it appeals to me.

TABLE 4. *Information development in France*

- DRGST
- BNIST (1973)
- MIDIST (1979)
  - *TELESYSTEMES*
  - *ARIST*
  - *NORA/MINC REPORT*

No minister in France has a global responsibility—although the Secretary of State for Research is more concerned than others. He is assisted by a Délégation Général à la Recherche Scientifique et Technique (DGRST), which sought advice on scientific information problems from a Comité Consultatif de l'information scientifique et technique, till 1973. In 1973 a new body was set up in the Bureau National de l'Information Scientifique et Technique (BNIST), attached to the Ministry of Industry, and dealing only with STI Information in a restricted sense. In this limited field, the Bureau was responsible for the formulation of a policy (subordinated to the interests of French industry), for the choice and financing (with very limited means) of some priority actions.

In 1979 the Bureau was transformed into a Mission Interministérielle de l'Information Scientifique et Technique (MIDIST), depending this time on the Prime Minister (through the Secretary of State for Research), with an enlarged responsibility and more important financial means. It deals with some important components of an information policy, such as the development of data bases and data banks, the improvement of specialized information systems and services, the assistance to scientific periodicals, the access of the public at large to information. Its budget (FF 36 M in 1980) enables it to enter into contracts with public and private organizations for purposes of specific programmes, and to initiate some interministerial programmes itself.

It is theoretically responsible for coordinating the information programmes of the ministries involved. But French government departments do not like to be coordinated, unless substantial financial advantages are implied. University and research libraries are the domain of the Ministry of Universities, public libraries and archives that of the Ministry of Culture and sectorial information systems (e.g. for agriculture) that of their respective ministries, each one using its own budget.

Since 1978 some governmental decisions are intended to pave the way towards a better coordination by helping in the creation and development of a number of data bases and data banks, by financing the organization of a national host computer giving access to most of these bases via the public telecommunication network (Questel-Telesystemes), by fostering research and development aimed at improving technical tools (software) of general usefulness.

I would like to remind you of course of the Nora/Minc report which appeared in 1978, but assuming it is well known, I shall not comment on it here. With the new government in France, however, it remains to be seen whether there is going to be a revival of some of its ideas.

French information policy sets have obviously resulted in two major successes: The first is the 'Agences régionales de l'information scientifique et technique (ARIST)'. Meanwhile eighteen ARIST agencies working at the chambers of commerce and industry in various regions of the country seem to be of topmost usefulness to industrial development. The trained staff working at the interface between databases and end users, knowing the language of both ends solve the problem of information transfer. Whatever many countries planned or plan to do, ARIST seems to be doing it already. These centres are getting very near to what is meant by problem solving information.

The creation of French databases supported by MIDIST and the great efforts made by telesystems to facilitate telecommunications in the country seems to be successful as well.

Spain

The present Spanish policy on Scientific and Technical Information, derives from the Report and Recommendations made in 1973, following a study and examination carried out in cooperation with OECD.

TABLE 5. *Information development in Spain*

Recommendation (1973)
CENIDOC (1975)
  INCA
  FUNDESCO

In 1975 the National Centre for Scientific Information and Documentation (CENIDOC) was created within the Council for Scientific Research, with the aim of coordinating STI activities on the public sector, specially within the Ministry of Education and Science where most activities were carried out. CENIDOC was conceived as a coordinating body, acting through three Institutes: one for Science and Technology, one for Biomedicine, and a third for Humanities and Social Sciences.

However, the successive reorganizations of the Research Council and of the Spanish Administration as a whole seem to have hindered the development of the CENIDOC idea, to the extent that it now is practically in a state of 'hibernation' and awaiting the final restructuring of the Research Council, started two years ago, but not yet completely finalized. Nevertheless, the three Institutes (all created on pre-existing units) have developed quite quickly and strongly and achieved an important task of coordination, avoiding the risks of duplicating efforts.

In parallel, the introduction of modern online techniques led to another coordination effort: five Spanish institutions, which offer online services, combined their efforts by creating the 'Automated Scientific Information Network' (INCA) with the aim of optimizing the access of Spanish users to foreign and international data bases, and promoting the creation of Spanish data bases.

Meanwhile the Fundación para el desarollo de la función social de las comunicaciones (FUNDESCO) was founded by the relatively rich Spanish private telephone company and has recently launched the investigations for a Spanish telematic-report obviously orientated towards goals similar to those laid down in the French Nora/Minc Report. Government agencies, publishers, universities and others participate. The title is 'The information society—Spain 1990', and judging from the draft table of content it seems to be mainly directed to the telematic field and its socio-economic consequences.

Belgium

A national information policy does not seem to exist in Belgium. There is a set of projects and the responsibility lies with various departments of various ministries.

Private enterprise seems to be one of the most important carrying factors in the information landscape of the country. A non-negligible factor is also the language problem.

Science and technology are the fields most projects are devoted to. Obviously the library world is still given priority but the establishment of documentation centres and the creation and usage of data bases have been recognized as important issues. Telematics, education and training as well as standardization have been taken up in government plans.

With these efforts Belgium is continuing its long tradition in fields like library work and the UDC. There does not seem to be a strong coordinating body, although the learned societies, particularly, and the academic world strongly ask for such an institution in the information field. In 1982, activities towards a better network solution in Belgium are expected to start.

The Netherlands

Perhaps the main issue of what could be called an information policy in the Netherlands is the coordination of the planning of information systems.

TABLE 6. *Information development in the Netherlands*

NOBIN (1971) information for industry network activities

In 1971 the Stichting Nederlands Orgaan vor de Bevordering van de Informations versorging (NOBIN) was founded supported by the ministries of economic affairs and education and sciences. NOBIN was actually designed to do a lot of the necessary planning and coordinating work in the field. But as in many other countries, decreasing budgets and too much struggle for one's own territory seem to have handicapped this work considerably.

In the Netherlands experts seem to be particularly unhappy about the unbalance between the enormous offer and the small demand in the information field. The Netherlands seem to have only made the very first steps towards developing a coordinated information policy mainly aiming at the establishment of a network for the ultimate user. Rivalries between several ministries or reluctance to delegate responsibility to the coordinating minister may have been the reason. Nevertheless, at the moment some important studies are undertaken especially for information for industry.

Switzerland

In Switzerland a commission for settling questions of coordination in the area of scientific documentation, the 'Eidgenössische Kommission für Fragen der Koordination im Bereich der wissenschaftlichen Dokumentation', was established by the federal government in September 1977. While the reports of various subcommissions already are in the hands of the main commission, the final report is to be submitted at the end of this year.

As far as can be foreseen at the moment—and things are kept in great secrecy—there will be either the recommendation that almost everything be left to private initiative or—less likely—that a strong coordinating body be established with little financial resources to coordinate existing efforts.

In 1979 SITI, das Schweizerische Institut für Technische Information, the Swiss institute for technical information, was founded to serve as an online centre and interface between database providers and users. It appears that the institute has not been used very much hitherto so that the experiment does not favour steps towards a state policy.

The learned societies are working hard in the field of education and training to convince the authorities of the necessity and usefulness of specialized training at various levels.

Switzerland thus, it seems to me, will be watching the developments in other countries once again before arriving at its own decision sometime next year.

Other countries

About the rest of the European countries I must confess I know so little that I do not risk to speak about their information policies. I think, however, a review of their policy sets would only be different in degrees, but not in essence from what was outlined before.

Viewdata systems

In my brief remarks, I have not said anything yet about viewdata systems. There can be no doubt about the enormous information possibilities inherent in this new technology and I do not know whether, at some later point, industry—as an example—might not decide on using such systems for internal purposes. After all, they are fairly cheap, provided they are sufficiently protected.

It seems, however, that in all Western European countries so far viewdata systems have not been integrated into information policy and the PTT's and Television companies have gone far to defend their territory or what they think is theirs. To picture the present situation, I have to briefly depart from my intention not to speak about the United Kingdom. Being careful, I shall do this by quoting the *Times*, Robin Young wrote on 27 April 1981: 'Launched in September 1979 Prestel was the first and is still the only fully operational and commercial public service viewdata system in the world. Its development since has been a crashing disappointment'. And he ends in saying: 'It offers the best guarantee that just as the telephone did not end the letter post, or television kill the newspaper, Prestel too will be an alternative to existing sources of information, not their replacement'.

I wonder, how true this will prove to be in the future.

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No information on information

I hope my good friends who supplied me with information on information policies in Western Europe will forgive me when I either used what they told me directly or distorted their input when using it. Maybe this is one of the most striking deficiencies in the field: the lack of information on information. And this is even true in everyday work. The various guidebooks are incomplete or wrong, or in any case misleading. The commercial ones are biased in one way, the official guides in another. And there seems to be a complete absence of well organized public relations about information. I think the lack of coordinating bodies and the fact that funds and time rank last on this particular sector is the reason.

Without good information on information, the why, the how, the availability and the user handbook, all information policies I fear are bound for trouble.

Comparisons

I am quite sure that you would now like to hear something approaching a comparative judgement of what was done in the information field in Western Europe. That of course is very easy . . . not to do!

In order to discover what is felt to be important now and will be in the future I would like to invite you to look at what everyone in Europe seems to be doing in the field:

TABLE 7. *Are there activities in the field of*

	networks?	*data compilation services?*
A	X	—
B	X	X
D	X	X
E	X	X
F	XX	X
NL	X	X
SCAN	XX	XX
U.K.	X	X

So network development and database creation seem to be considered to be important. And I agree. Another interesting question is:

TABLE 8. *Has the information policy changed considerably?*

A	—
B	—
D	yes
E	yes
F	no
NL	yes
SCAN	no
U.K.	—

Perhaps no change in the past is an indication of the right concept. Another indication could be:

TABLE 9. *Is there a fairly strong Coordinating body?*

A	no
B	no
D	no
E	no
F	yes
NL	no
SCAN	yes
U.K.	no

At least a correlation between the answers in Tables 8 and 9 seems possible.

The past may have taught us some lessons which are useful to learn before extending old or creating new policy sets.

TABLE 10. *Lessons of the past*

— convince all partners first
rather than struggle the way along

— have a flexible policy set
rather than 'a policy'

— have a coordinating body
rather than 'one responsible'

— plan production
rather than structures

Future aims

If this policy is intended to be successful I am convinced that it can only be so if it promotes and/or offers two things in the future: promoting information mindedness and offering problem oriented information. The promotion of an information mindedness—some people even call it information culture—and of activities to foster from childhood the habit of seeking information and using it as a problem solving resource at home, at school and at work is certainly needed as a basis. The offer of problem-solving information—maybe through information analysis centres and properly trained people working at the interface between information systems and users—seems to be the aim of all information policy. And all information transfer should be human, respecting human dignity and avoiding machine-phobia. Policy designers might like to keep that in mind.

A sensible combination of state and private enterprise, a good mixture of philosophy, technical skill and practical application seem to be able to pave the way. And there may be even another resource yet unused: Independent but sufficiently powerful national coordinating bodies should cooperate internationally. I do not mean the international bodies at UNESCO, OECD, EEC and others. I mean the exchange of ideas between those practically engaged in the implementation of information policy in a country who should remain in close contact with their neighbour colleagues. In view of the fact that their products, information, keep crossing the border the lack of cooperation in this field can hardly be understood.

Conclusions

I believe in the basic right of people to be informed. Hence I believe in information. And this is the reason why I think we should try again and hard, everywhere in the world, to develop a decent set of policies to ease the flow of true and valuable information. I am aware of the fact that an information scientist runs the risk of overestimating his own field. Being an engineer by training, I consider it as my job to keep looking for bridges to span the gap between illusion and reality.

To conclude, let me suggest one:

Information surely is not knowledge
and knowledge certainly is not wisdom
but information is a tool
    towards knowledge
and even people with knowledge
    may become wise

Discussion

SESSION ONE

The following points were made during the discussion:

1. The relative states of technological advancement in the U.K., the U.S.A. and Japan were discussed. The speaker's travels in those countries indicate that they are fortunate in the dedication of the information managers. This might be a problem in the U.K.
2. An interest in the POLIS system operating in the House of Commons was expressed; there was concern about the resources and degree of commitment from the House of Commons. Unfortunately the Parliamentary Committee is not permitted to look into the internal management of the House of Commons and House of Lords.
3. Although individual countries were well catered for, the role of ISO in the harmonization of information in Europe was also considered. Harmonization was to be encouraged but it was important that an international policy did not replace or override individual national policies.

Microcomputers in libraries and information departments

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Introduction

THE PURPOSE OF this paper is to outline the potential role of microcomputers in libraries and information departments and to indicate the likely pre-conditions which may well have to exist before this potential, in my view, can be realised. To a certain extent I have deliberately made this paper speculative. If some of my comments appear barbed or doom-laden I do not apologise. I trust the institutions concerned including ourselves—the information profession, may feel suitably provoked into positive action.

Despite the various descriptions of microprocessors which have appeared in the press in recent time, I think it useful to outline what I mean by the terms microprocessor, microcomputer and microcomputer system.

Microprocessors

A microprocessor is a microminiaturised equivalent of the Central Processing Unit (CPU) of a normal computer—more or less. It contains similar elements such as registers, instruction decoding circuits, and an arithmetic unit. Like a CPU it requires the addition of further components in order to function. These would be power, a clock, memory and devices to interface with the 'outside world'. At this level 'outside world' usually means address and data highways. Microprocessors should not therefore be thought of as 'computers on a chip'. Main frames and minicomputers can be characterised operationally in many ways. At the microprocessor level relevant dimensions to this discussion concern speed of operation (related to the electronic fabrication technology employed in the component parts); size of memory which can be addressed, power and versatility of the instruction set; and related to these the size of the word length utilised by the machine.

At the present state of the art microprocessors are available as a single chip device (incorporating a clock, a tiny memory, and a word length of up to about 8 bits); as one of a related family of chips (microprocessors of fixed word length e.g. 4, 8, 12, 16 bits) with peripheral handling chips for input/output (such as to and from VDU's,

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teletypes, disk storage units, tape drives . . .); and as 'bit slices' where chips can be cascaded to provide CPU's or peripheral handling devices of any word length. It should not surprise you to know that such microprogrammable bit slice chip sets are now being utilised as CPU's in some of the latest mini and main frame computers. At the present time most microprocessors incorporated into 'systems' utilise 8 bit words and are capable of addressing about 64 K bytes of memory. Some can address directly up to 1 megabyte or more. Instruction sets comprise combinations of instructions and addressing modes but often lack arithmetic instructions for multiply and divide.

Microcomputers

Whereas the microprocessor is considered at the component level the microcomputer can be considered at the level of the assemblage of components—perhaps as the contents of one or more printed circuit boards—perhaps as a black box. Such a box comprises a power supply, a CPU together with clock circuits and peripheral interface circuits and random access memory. Additionally it is almost certain some memory would be read-only (permanent) memory and would contain certain instructions to facilitate communication with/by the microcomputer. Such instructions would facilitate entry and execution of programs.

Use of Microprocessors

For the purpose of this paper I consider microprocessors to be used in two major area of application:

(a) as electronic components dedicated to a single application;
(b) in microcomputers.

Dedicated applications

In these applications use of a microprocessor is 'transparent' to the user. Particular problems have been solved by using the microprocessor to realise some electronic control device. Instructions in read only memory relieve the user of doing anything other than of operating the device itself.

Typical applications are in cash registers, supermarket label printers, digital weigh-scales, washing machine controllers, book-issue controllers, 'intelligent' terminals, online user-aids . . .

Clearly criteria for use in such applications are related to the cost of development and production in the trade-off equation between a traditional electronic approach (i.e., cost of developing hardware) and a balance of hardware and software implicit in the use of a microprocessor. It is in these applications that instruction sets and memory addressing limitations are of no great concern since typical programs are short and written in a low-level language and are finally loaded permanently into read-only-memory as directly executable machine instructions. Programs can be changed but involve the physical replacement of read only memory components.

Microcomputers

I do not attempt in this paper to draw real comparisons between microcomputers, minicomputers and mainframes. Restriction in word size, execution speed and memory size have already been mentioned in this regard. Whenever local computing power is required and where job execution is not highly time critical microcomputers offer certain apparently attractive features. Besides small physical size, ruggedness and modest price there is available a wide range of high level software (compilers, interpreters) and of high performance peripherals (extra memory, VDUs, floppy discs and other disc storage devices) which permit the local execution of jobs which otherwise would have to be referred to another (remote) machine, if they were done at all.

As computer systems the field of application for microcomputers—within required performance limits—is restricted only by the availability of programs to execute particular tasks and by operating systems by which jobs and demands for use of peripheral devices can be coordinated.

Microcomputers are now being used in businesses of all sizes to do such jobs as:

word processing
local pre-processing of data before passing to a main frame or minicomputer
pay roll and ledger work
stock control
computer aided instruction
computer aided medical diagnosis
training aids—teaching.

To support these applications suppliers install systems which comprise one or more VDU's, a CPU with up to 64 kilobytes of storage per user, one or more printers, two floppy discs offering anywhere between 160,000 and 2,000,000 characters of storage online, and a hard disc. This might be either a Winchester technology device of up to about 40 MBytes capacity, or a removable cartridge disc of around 16MB fixed, 6MB removable.

As system capability is increased there is some difficulty in distinguishing between micros and minis. The basis of selection is purely an operational one based on apparent fitness for the intended purposes as set out in the system requirement specification prepared by the user and the systems specifications prepared by the hopeful contractor.

Software

It is a recognised trend that as hardware prices continue to fall (at least in comparison to capability of the hardware) an increasing proportion of development cost in computing, whether in systems work, or in producing end-user applications is in the cost of software. In time we shall no doubt see sophisticated software writing devices, there has already been announced such a program—called 'The Last-One'. Future microprocessor devices may well handle high level language instructions and system calls directly. At the moment software production is a labour-intensive activity and it is a very expensive activity. So far as microcomputers are concerned fast efficient code has to be used especially where the program is not input-output bound. In turn this is dependent not so much upon the choice of language *per se* but on the availability of efficient compilers. These are available for FORTRAN, COBOL, ALGOL, BASIC, PASCAL and for other languages. This availability is, however, linked to specific microcomputers usually by a requirement for the presence of a particular operating system.

There is now becoming available a range of well developed systems software such as operating systems, disc operating systems and utilities which facilitate program development and execution. Such systems are of particular importance when large data files have to be created and arranged by an application program. But the relationships between available applications software, operating systems and particular microprocessors used in microcomputer systems remain something of a minefield for the unwary.

Business applications

Microprocessors as originally developed were not a phenomenon of the computer industry but of the electronics industry. They were designed originally not as an exercise to physically reduce the size of a main frame or minicomputer but to provide a reconfigurable universal electronic component which could be programmed to behave in such a way as to reduce the number of individual electronic components required to realise an electronic design. Individuals in both the electronics and computer industry saw the potential of using these devices as computers in markets hitherto untapped—particularly the leisure industry. A large number of entrepreneurial companies were formed to produce microcomputers and to market them. Soon it was seen both in the U.S. and the U.K. that the market demand lay not so much with hobbyists as with small businesses. This observation has lead directly to several phenomena relevant to this discussion. Firstly, anyone selling apparently low-cost computers could only do so provided comparably low cost software was available to go with it. High cost of software development had to be recovered from the sale of many copies.

Secondly, since it would not be possible to provide field support for users nor to tailor the software to individual requirements users had to be prepared to change their procedures where necessary to suit the requirements of the package. It has been suggested by Zaks recently that this is how the market actually operates. The corollary is that companies only invest in the considerable software development costs in market areas sufficiently large to generate the necessary volume of sales and of profits. A recently published list of software packages available, supported at the national level and which have been in use for at least six months in a minimum of five sites gives products of 45 companies for 31 different microcomputers and covers 83 distinct areas of applications. A summary of the list is given in Table 1.

Few of these packages are of direct interest to libraries, though some of the database management systems and word processing packages have obvious attractions.

The point I am making is that packages suitable for use in libraries will not be developed by the commercial sector until the library and information market is perceived to be one of sufficient coherence and size to warrant the considerable investment needed. By coherence I refer to the likelihood of one or a few packages covering most needs for a particular application in sufficient numbers of libraries as

TABLE 1. *Business software for micros*

Application	*Machines*	*Cost-range* £
Stock control	24 + CP/M	10–1500
General ledger	19 + CP/M	225–500
Word processing	18 + CP/M	15–500
Integrated accounts	17 + CP/M	75–2000
Purchase ledger	16 + CP/M	25–500
Sales ledger	16 + CP/M	90–800
Payroll	15 + CP/M	10–1500
Mailinglist	15 + CP/M	25–450
Information retrieval	14 + CP/M	33–750
Invoicing	13 + CP/M	25–500
Time/costs	11 + CP/M	200–450
Estate agent	9 + CP/M	28–850
Job costing	7 + CP/M	300–990
Financial modelling	1 + CP/M	95–450
69 other applications	4 or less per application	10–650

to be worthwhile. Implicit in this is the requirement for some agreement upon the appropriate machine to be used since an absolute freedom of choice may reduce the likelihood of the emergence of suitable packages from this sector!

Library applications

A cursory look at activities which are carried out in libraries and information departments suggest a large number of areas of potential applications for microcomputers. These activities are outlined in Table 2. How microcomputers might be utilised in these areas has been outlined elsewhere. What is actually being done?

The only barrier to the widespread use of microcomputers in libraries is the availability of suitable software—provided of course the overall costs stand comparison with other alternatives. For the reasons I have outlined already the number of commercially available packages specifically for library oriented tasks is small.

Complete circulation control systems based on microcomputers are available and a rather sophisticated system with four work stations and large local storage was recently announced by Plessey Telepen. The software is not available separately.

Some companies have at some time announced the availability of versions of mini- or main frame packages for implementation on micros. Most noticeable amongst these are Libra Information Systems—CAIRS, ICI—ASSASSIN. A complete database creation; manipulation and retrieval system called STAR is available from Cuadra Associates. Data entry and manipulation under program control and data saving to industry standard magnetic tape is being developed by Ian Hamilton of HSOP Text Processing.

TABLE 2. *Microcomputer applications in libraries*

- Stock acquisition
- Notification
  - e.g.—Accession lists
  - —SDI
- Cataloguing aids
  - e.g.—Library stock
  - —Special collections
- Indexing aids
  - e.g.—Catalogues/journals/book indexing
  - —Thesaurus development
- Circulation control
  - e.g.—Book loans
  - —ILL
  - —Short term collections
- Retrospective retrieval
  - e.g.—Online aids
  - —Fact retrieval/personal databases
  - —Database creation/retrieval
- Serial acquisition
- Training aids
- Administrative aids
  - e.g.—Cost modelling
- Word processing

Online retrieval user-aids have been developed by Phil Williams—USERKIT and by the Franklin Institute—OL'SAM. The latter is available as software only if required. The purpose of these devices is to facilitate online searching through various time-saving strategies during dial-up or while searching.

The British Library has been influential in this field in several ways. Bibliographical Services Division have developed CORTEX using Zilog equipment. This permits local editing of MARC-type records for later transmission and storage during LOCAS operations. This saves connect time charges while raising the frustration threshold. The Research and Development Department are funding several projects. The College of Librarianship Wales has recently received a grant to develop online search simulation packages as teaching/training aids. BHRA Fluid Engineering is currently working on a project to investigate the feasibility of using systems software to avoid the development of dedicated applications software for certain library tasks. Kent-Barlow Associates have developed a database creation retrieval system currently being implemented in school libraries as part of the Aslib Schools Information Retrieval project.

A considerable amount of development work is also being carried out by libraries and information departments themselves.

At the University of Surrey catalogue input formatting and validation is carried out using a North Star Horizon microcomputer. Entries are saved on floppy disk and transmitted at intervals over a cable to the University's ICL 2904 to update the master catalogue.

NCR point-of-sale terminals have been used as the basis of circulation control system developed by the library of the Swinburne College, Australia. Cassette tape recorders are used to store 3-400 transactions daily. Several library schools in the U.K. and elsewhere are developing online search simulators to reduce both actual online costs while also saving teaching and staff costs. Some development of response frames for computer aided instruction is also being undertaken. INSPEC use PET computers to familiarise new members of staff with DIALOG commands. PETs are used at Ilkeley College as is an Apple at West Suffolk College of Further Education for periodical receipt and circulation control.

Some of the load on reference librarians can be relieved through REFLES due to Kathleen Bivins. Implemented as a TANDY TRS-80 this provides the answers to often asked questions on loan policy, library stock, guiding and general directory information. Many other information retrieval applications have been reported. At Napier College, Edinburgh the library staff have developed SIR-Simple Information Retrieval. This package runs on a North Star Horizon computer and is used both for database creation and retrieval. It is hoped to develop other versions for 'popular' machines and CP/M. Personal databases have also been implemented. An interesting departure in the creation of a physical properties databank for chemical compounds. This has been written in FORTRAN and implemented on a CROMEMCO computer by Peter Norman at the University of Newcastle. Several tools to assist in creating back-of-book indexes have been produced and implemented on microcomputers.

However, while this wide range of actual applications is exciting many possess strict limitations. These limitations are limited portability, dedication to their own specific environments (bound either to hardware, or to institutional requirements). Examples such as these indicate what is possible but even if examined carefully and in depth will not clearly indicate what may work for you.

Implementation

Having decided the problem is suitable for solution by installation of a microcomputer and having prepared a detailed specification of requirements how should that decision be implemented? Basic choices might appear to be: purchase of a ready-made system; use of a system house to develop a bespoke solution; do it yourself with or without the help of a consultant.

Ready-made systems

As I have already indicated except for certain broad business areas and certain well defined areas of library activity such as database creation, BLAISE related cataloguing operations, online support, and word processing there are few, if any, systems suitable for rapid installation in libraries. There is at the moment also no easy way of discovering what is available. However, if an apparently suitable ready made system is selected for further consideration then the usual caveats regarding required alterations and field support must be applied.

Systems houses

There are a number of system houses now specialising in microcomputer applications. When evaluating tenders received as a result of circulating the detailed specification of requirements it is a good precaution to ensure the systems house is able to demonstrate its expertise by reference to other systems already installed.

Remember, the system supplied will be designed to meet your requirements and the systems house will expect you to pay for any alterations you make in the specification! But at this level the apparent cheapness of a micro-based solution is likely to disappear.

Do it yourself

Many of the developments in library applications of microcomputers, such as those described earlier in this paper, at the moment fall into this category. However, there is an underlying assumption that programming skills are widely distributed or can be easily aquired. I do not believe either to be wholly true. What is certain is that a large amount of staff time and staff cost can be dissipated by this route. When considering this alternative the cost must be included in the assessment. It is at this level also that implementation of a system reported in the professional press may be contemplated. The chances are that the machine used is different, the operating system different, the operating environment different, and while the software will be written in the ubiquitous BASIC it will turn out to be non-transportable. On the other hand the approach used may well offer insights on how to proceed with one's own system.

Some conclusions

1. Until commercial interests perceive the library market as viable their interest will continue to be in providing systems only for certain well-defined areas of library activity, such as online support, database creation and retrieval, large circulation systems, networking and word-processing.
2. It is certain that a great deal of energy and money will be dissipated by organisations going it alone as indeed they will have to do to create the systems they want.
3. There is some evidence of the emergence of entrepreneurs, individuals, who acting as consultants can make a significant impact on (2).
4. At this stage, to help the library and information community at large we need to define and publicise some broad categories of system hardware and software to facilitate the creation of software that is not only transportable to the target system but can actually be implemented upon it! Such categories need not be unduly restrictive. An exercise conducted recently by the Council for Educational Technology on the use of microcomputers in schools is illustrative and the approach might be extended to cover microcomputer operating systems and choice of high-level languages. This is especially important at this time when librarians are beginning to appeal for help—any help—before making their purchase decisions. The British Library is in a key position in this matter. If this is not done we shall see only the globally expensive development of a large variety of 'local' systems.

5. Lastly, but by no means least has to be the acceptance that cheap software will only be possible where libraries and information departments are prepared in some cases to change their procedures to take advantage of it. This entails some sacrifice of the individuality of libraries that may not be forthcoming.

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Data retrieval systems and international publishing

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Chairman, Pergamon Press and BPC

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Introduction

It is tempting, but perhaps premature, to assume that there is a European information industry. Although online database searching has moved beyond the stage of being a 'technical toy', it is still an industry dominated by a number of problems—technical, political and economic.

The technology and systems are still often user unfriendly having complicated logon procedures and a mystical jargon. Politically, the data retrieval industry is dominated by the large US data bases and their vendors or hosts. Economically, the market is but one tenth of that in North America, accounting for at best half million online searches per annum.

It is symptomatic of the youthfulness of the online industry that such problems constitute the basis of much of the discussion between the various information sectors. It is also symptomatic of our early development that there is much activity in trying to reduce the impact of these problems to the end users of database information. Much of this goes unheralded. I would like to address a number of major problem sectors in data retrieval systems and publishing and describe some of the efforts underway to redress the difficulties. Some of these efforts are being led by individual publishers and librarians that have an expansionary view of the future; others are being progressed in a new and healthy climate by groups of publishers working together for the first time.

But firstly, a matter of definition. This talk will cover just two sectors of the broad data retrieval and publishing industry. The first sector is concerned with bibliographic and to some extent full text of scientific and technical material, where I shall be talking about online hosting and trends in database publishing. The other topic covered will be progress on document delivery of scholarly journal articles. These are areas in which Pergamon Press is now actively working. In my presentation I shall first mention some of the current economic problems of these sectors and some of the developments which publishers are currently working on.

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Some problem areas

The economics of database vending

At present the European online database industry is dominated by the three leading American hosts—Lockheed, SDC and BRS. These information utilities have a considerable time lead over comparable hosts in Europe. One result of this is that Lockheed, for example, has a comprehensive selection of some 150 data bases accessible through a single password and software retrieval system, which has generated a considerable loyalty in its use.

However, there are political and economic issues which this raises.

> First, many databases avilable on the US host networks are produced in Europe or the UK; this means that the European end users find themselves *reimporting data into Europe* which was originally produced here in the first instance.
>
> Second, it is *expensive.* True, Lockheed has recently provided a leased line hookup between London and their computer facility in California, but it is still expensive in terms of telecommunication charges to search US hosts. The connect hour charges could raise costs by 25–30 per cent for the end user.

These factors make it desirable to develop a healthy European online host network. While it can be claimed that the 36 hosts currently linked to Euronet might be considered the basis for such competitive system, it should be borne in mind that nearly all of them are heavily public-funded, highly specialised in their subject orientation, and therefore unlikely to pose much of a threat to the large online vendors.

However, there are considerable costs tied up in developing software systems to enable effective retrieval from hosted databases, as well as costs associated with computer hardware and ongoing computer storage, and European hosts must be able to recover these costs if they are to survive. There will be little opportunity for major savings to be made in these areas in the immediate term although it should be pointed out that the costs of online searching now are no greater than they were some 4 years ago, despite the intervening inflationary price escalation.

The economics of bibliographic database publishing

Most secondary data retrieval services depend very heavily on the income they receive from their printed abstract journal publications for their survival. Despite all the talk about the online database revolution, some 70 to 90 per cent of the revenues which such services receive come from the print publication side with only about 10 per cent attributable to online royalty income.

The printed journal subscriptions of secondary services are declining at a rate which is causing considerable concern. In effect it means that the actual amounts of reveue being received to support the creation of the master data base is insufficient in many cases.

Can online searching fill the revenue gap? It seem unlikely. Although online searching is growing at annual rates estimated at between 20 to 45 per cent per annum, with 30 per cent being the mean, it should be pointed out that such rapid growth is from a very small base of operations. Although there were some 5 million online searches in the United States in 1980, in Europe we can only count on one-tenth of that number. This is shared amongst the 700 to 800 databases currently searchable. Most databases therefore have in principle limited potential individual accesses.

Another major cost factor to be considered is that the publishers of the database do not receive a large proportion of the royalties paid by an end user for searching specific databases. In real terms if a database is located on a North American vendor, of the plus or minus £40 per year connection charge, only £10 would be attributable to the database owner. The rest goes to the host or vendor, who provides the software and the storage mechanism, and to the telecommunications authorities. So a considerable increase in growth rates is required for database creation services to benefit.

The economics of primary journal article publishing

Publishers of printed information are also suffering from cutbacks in library budgeting. This has led libraries to share their resources in a much more efficient way but by derivation cuts down subscription revenues.

Instead of libraries holding full archives of publications related to broad subject areas—the old 'Library of Record' approach—libraries have had to be more selective in choosing their acquisitions and in so doing take full cognisance of what other libraries geographically adjacent or part of the same library network are doing.

One of the obvious results of the need for libraries to keep down their acquisitions budget has been that an increasing proportion of those information items which are still required are being met by increased photocopying. This is a *fait accompli* and no argument between publishers and librarians will detract from the fact that considerable amounts of systematic photocopying of scientific/technical material is being undertaken. The original publisher receives very little benefit from this. From the British Library Lending Division report for last year it appears that there are some 2.8 million requests being received, of which 2.3 million come from the UK. Of this figure 1.4 million was dispatched as photocopies. There are other major centres throughout the world which are also operating similar services although of a less successful dimension. CNRS in Paris, TH Zurich, Technical University at Delft, The Center for Research Libraries in Chicago etc. are all examples. In addition the growth of 'information intermedaries' in the private sector in the United States have generated a substantial document delivery traffic.

One factor here is the growth of online bibliographic search services which leads people to want copies of articles which are not in their own library. This increases the demand for 'separates' i.e. the demand for document delivery. The effect for publishers of primary and secondary information is that fixed costs of generating the published information have to be shared across a narrowing market base. Fixed costs constitute a heavy element in a publisher's cost schedule, and thus raise the unit price to the fewer existing subscribers which currently cannot be allocated in part to the 'separates' market. This resulting price spiral is of no benefit to either publishers or librarians.

Some developments by publishers

The database hosts

One specific new development which I can mention is that there is now a new host available in the UK, accessible through Euronet, which I believe will make a substantial impact on the economics of database searching.

Pergamon Infoline is now operating and I would recommend that you spend a few minutes at the Infoline stand seeing what this new service can offer you. There are basically two major reasons why it will lead to an improved situation:

(a) We have incorporated the most up-to-date developments in computer hardware—Pergamon Infoline has the largest installation of the Vax 11/780 in the world with an immediate 7 billion byte storage capacity. A BASIS software retrieval package has been specially designed for running on VAX. It is our intent to keep costs down as much as possible by employing such advanced systems. Infoline is in a strong position, with the full resources of Pergamon Press at its disposal, to adapt to new product formatting needs.

(b) It is part of an integrated publishing operation, with an ability to draw on all stages of the information process for its material. Unlike other hosts in Europe, it is owned by a publisher of primary and secondary information.

The trend towards full text publishing will have an impact on the need for secondary database information. Full text, with free text searching capabilities, will erode some of the secondary database publishing market. The success of the Mead Data Central with their full text legal files (LEXIS), news files (NEXIS) and the assumed science and technology files in the future is a precendent in this area.

This means that both large database and primary publishers will be hosting their own databases in future. The falling costs of information storage and retrieval will enable a direct link to be forged between information provider and user, and to bypass the online vendors (except for highly specialised and small files). Moreover the setting up of Pergamon Infoline is by no means an isolated example. For example I.S.I. is now offering their own Science Citation Indexes and Social Science Citation Index databases online. Chemical Abstract are now offering their new database CAS Online. Data Resources International has for long built its own databases and has had its own online distribution. In other words the trend is for large database publishers to begin to offer online publishing services themselves.

Developments in the database publishing industry

As mentioned earlier, the printed revenue receipts received from abstract journal sales is falling; the online royalty income whilst growing is not doing so at a sufficiently rapid rate to counteract the decline in printed revenues. In a study commissioned by ICSU AB, T.P. Barwise of the London Business School analysed the economics of the situation in 1978 with the aid of a computer programme. His study concluded that online royalties are low in relation to the price of printed products, and he suggested that they would need to be increased by a factor of 2–2½ times over the period 1978–83. Some of the large US databases have been witnessing some fulfillment of this prophesy, but there is still some way to go before database publishing can be considered a viable and healthy financial proposition. On the same issue, Martha Williams (University of Illinois) has conducted a more recent investigation into the 'Relative impact of print and database products on the data producer' which consisted of a 13 year financial analysis of one large database. (This article has just been published in one of Pergamon's journals—*Information Processing and Management*—Vol 17 issue 5.)

Martha Williams argues that the problem in database publishing is that of maintaining a balanced financial status in the light of increased income from one class of products (online royalties), decreased income from another class of products (licensees of tapes and print product subscription), and the increased cost of the operation. Williams also confirms that the most promising approach for the future lies in the area of pricing—'there appears to be no alternative to increasing the prices for online users'—and the development of new products and services.

Having delivered this rather unpalatable message, what else can the publishing industry do to minimise the consequences of this need for higher prices by the secondary publishers? An activity which I can report on is the development of new information services which provide added value to the secondary databases. There are two which are particularly appropriate.

Linking text and graphics

Firstly, a significant problem facing database publishers is that traditionally only those with subject matter which lent itself to bibliographic or data retrieval systems could make them available online. Where there was a large graphics or illustrative component, the existing online database retrieval systems have not been considered suitable. This difficulty has recently been resolved for some specific applications by a merger of technology—the computerised database retrieval systems providing text and data access, and videodisc technology the associated pictures. An example is Pergamon's recently launched VIDEO PATSEARCH service in the United States. This enables an online search to be made of all 700,000 US patents issued since 1971. The bibliographic file is stored on BRS in the United States, and soon to be made available on Pergamon Infoline in Europe. The graphics are available on a set of 8 videodiscs attached to the user's terminal. Results from the bibliographic search are translated by a microcomputer also located in the user's terminal into an image location on the videodisc and these are transmitted to videodisc player. The image is displayed on a special screen within two seconds of the instruction being given. The user's terminal is a total new departure for publishers—it represents a commitment to providing suitable hardware to the end user.

—a video patsearch terminal, with two screen (one for text:
the other for graphics)
—a text printer
—a set of 8 videodiscs (plus update discs)
—interactive videodisc player
—telecommunications interface
—software to provide automatic logon procedures
—optional videoprinter (for reproducing drawings)

All this is provided for an annual fee of $6,000 per annum; UK prices still to be agreed. The system will be available on Infoline by the end of the year.

Whilst originally designed for patent information, it is clear that such a system may be applicable to several other database searching applications in which graphics provide a significant add-on value.

Integrated database publishing

Secondly, the continuing fall in information storage and retrieval costs has made possible some further steps towards so-called 'integrated database publishing'.

This concept means that a publisher has his author's text or data in machine-readable form so that he can, at will, publish in different formats for different audiences. Eventually possible formats may range from hard copy full text, stored entry on computer files, on optical disc, as a set of Prestel frames etc. It also usually means having some computerised ability to search, sort and manipulate the database so that different publishable products can be spun-off from the same database e.g. titles, article abstracts, author indexes, subject indexes, etc.

Admittedly publishers will have to invest a great deal in software to be able to standardise, utilise, manipulate and transform the initial machine readable text into the variety of desired outputs. But the technology to do so is constantly improving and much investment is being made by publishers, terminal manufacturers and computer typesetters in better hardware, software and methods. What will this mean for international scientific and technical publishers, and the authors, learned societies, universities and research associations that they serve?

Above all it will mean that since quite large investments in software, staff training and equipment will be needed to develop the techniques of database publishing, publishers will be able to offer these services to organisations which on their own could not possibly finance their use or development. In other words just like previously publishers could offer to authors and learned societies a collection of resources in the form of skilled editors, style-editors, lay-out artists, proof readers, print buyers and skilled marketing and distribution services, now publishers who make the necessary investments will be able to offer in addition, enhanced capabilities in helping to store and build scientific and technical databases and distribute them in a much greater variety of formats tailored to the needs of the intended audience for the information. Pergamon has now begun to co-operate with a number of learned societies and research associations jointly to develop and market specific databases, and we hope to be able to offer database publishing services more widely in the coming years.

Research in document delivery

Before full text publishing arrives—arguably there is question whether it will ever cover all areas of science and technology publication—there is the unquestioned demand for individual or 'separates' of articles identified primarily from an online search of a comprehensive database of bibliographic citations. There is a large and growing traffic in such document requests.

This represents a challenge to publishers to invest much more seriously in systems to produce and distribute 'separates' so as (a) to help provide libraries with a cheaper, more efficient and faster document delivery service than they now have, and (b) to recoup some of the income now being lost to photocopying, so as to help maintain the economic viability of many reputable journals now threatened with extinction.

These are the reasons why publishers are now coming together amongst themselves and with librarians to look at this problem. A number of technical schemes are being formulated for providing the publishers document delivery services which would be an improvement over that being performed by libraries and information intermediaries at present.

One specific proposal which is currently under active review is the so-called ADONIS concept. This is an agreement among 5 major commercial international journal publishers to share their resources in creating a database of all journal articles which will be stored on digital optical discs. Investment in this is huge and nothing will be apparent until early 1984, but with the technological and configuration proposed it will supply 'on demand' journal articles to large end user libraries, such as for example the BLLD. In doing this a small royalty fee will be earned by the original publisher of the article, which will support his publishing activities, and yet the price to the library will be equal to if not less than the competitive price charged by manual systems.

There are three distinct features of this ADONIS concept:

(1) Firstly, the major problem facing the future of learned scholarly journals has been recognised as an issue which deserves considerable attention. The problem has therefore been isolated.
(2) Secondly, a group of leading publishers have agreed to co-operate on resolving this problem through providing a backup document delivery service. Pergamon, Elsevier Science Publishers, Wiley, Springer Verlag and Blackwell Scientific have set up a separate 'consortium' to administer the project. A cooperative spirit has been generated.
(3) Advanced technology has been identified as the mechanism whereby such co-operation can minimise the problem. (Philips 'Megadoc' together with a high speed/high resolution Group 4 facsimile printers.)

It should be recognised that this is not an attempt by the five publishers to dominate the substantial amount of document delivery traffic. Rather, it is a means to allow other scholarly publishers, by providing their publications to a central processing facility, to receive a financial return which has been traditionally lost to the xerox copy machine operators, the interlibrary loan circuit and the many 'information intermediaries' in the States (such as ISI, Find, UMI etc).

However, ADONIS is only one such scheme.

* The European Commission is actively pushing for a unified document delivery system by publishing documents using facsimile transmission over Euronet as the delivery mechanism—(The ARTEMIS concept).
* The UK Department of Industry is investigating the application of Teletex (together with facsimile) as an electronic mail service with a document delivery backup. Pira and the National Physical Laboratory are evaluating this so called HERMES concept.
* The Publishers Association is looking at the possibility of creating its own document delivery mechanism through a newly formed company called Publishers Data Base Ltd.

Conclusion

This overview indicates some of the problems affecting the data retrieval industry in Europe at the moment, and how some of these problems are being resolved. It is not a time or circumstance for complacency. The whole of the online industry is in a state of major flux. Resolving some of the existing problems will only cause new ones to arise.

Technology is being applied in some places with great success. But unless the adoption of these new systems is matched by a willingness from the customers to use them, there is a possibility of much wasted effort and resources. This dictates that a much closer relationship needs to be forged between the database publisher and the librarian and end user to alert, at the earliest possible stage, any possible mismatch between application of technology and user acceptability.

By the same token, much more work has to be done within the industry to establish useful and appropriate standards for the technologies currently being applied. There are many examples of the total destruction of a potential market by the uncoordinated creation of noncompatible products. It would be fatal if the scientific/technical information world would suffer the same fate. Pergamon Press is perfectly willing to to use its expertise in assisting the creation of such standards.

Discussion

SESSION TWO

The following points were made during the discussion:

1. Infoline is available through any terminal, it does not need a dedicated one.
2. Europe should learn the lessons from the past of giving away such publications as *Chemical Abstracts* to the US. Such publications are a national resource like oil and coal and should be treated as such.
3. Everyone has experience of using databases. Producers and consumers are in trouble at the moment because of lion's share of the profit goes to the intermediaries (spinners, software creators, hardware manufacturers, telecommunications). Maxwell predicted this would not last long e.g. Pergamon is investing £2 million/year over the next 10 years. At present the only non-US service is Referativny Zhurnal; Pergamon has an agreement with VINITI which may develop into a service to compete with the US Chemical Society.
4. A publisher's first priority is to the author, i.e. by the dissemination of his work. Although it is wrong, in some peoples view, to cross-subsidize from hard copy to online service, it was necessary. This situation is changing since it is no longer possible to raise hard copy prices. Online charges will have to increase.
5. Funding of research projects in this country has only just started to include an allowance for dissemination of information. The UK has spent millions of pounds on research the results of which have never seen the light of day through lack of funding. Those who fund research must accept responsibility for dissemination of the information. HMG and EEC have now, at last, agreed to that principle. The US has been doing it for 20 years.

Computerised information retrieval—closed or open: some criteria for a closed system

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IT IS NOT clear that 'closed' and 'open' are terms of art when used to qualify information retrieval systems, though it is true that Prestel allocates some pages to 'closed' user groups. This gives some clue to the nature of the distinction, which even if not yet elevated into the status of technical jargon, can shed useful light upon the design and practice of information retrieval systems. In order to elucidate the distinction it may be helpful to select a few different examples, and to examine their characteristics. Since my own experience is principally with legal information retrieval systems I shall rely upon them as examples wherever possible.

The first and most fundamental point is that 'closed' and 'open' are not, in relation to information retrieval systems any more than to anything else, exclusive and exhaustive alternatives distinguished from each other by the presence or absence of one key and easily identified characteristic. They are more fruitfully conceived as lying at opposite ends of a continuum, and the intermediate points on the continuum cannot be separated by reference to any single characteristic.

At one extreme lie wholly private systems with access granted to a very restricted subset of users. A typical example might be an in-house retrieval system for a firm's own confidential documents. Such a system presents few problems, and very little interest, for the rest of us. There is however a variation upon this pattern which establishes the closed position in a more interesting way, because the system is generally available. Indeed it is simply that feature, general availability, which distinguishes it from the totally in-house system. Such a system would be a private library put up on a central computer separately owned, operated and located, but accessed only by the database provider. Thus Butterworth Telepublishing offers the facility for firms of lawyers to use the facilities of the central LEXIS computer, which largely stores public databases, to store the firm's own private library of in-house opinions, and other confidential documentation. This system is remarkable in that the information is very highly confidential, and the confidence needs to be preserved against other users who have routine access to exactly the same computer system, and may indeed be on opposing sides in the very same piece of litigation. The main advantage for the user apart from the obvious saving of time and effort in planning, acquiring and operating his own system, is that he can use the same equipment and techniques for using his private libraries that he employs for public libraries. The software would, for example, routinely allow a search to be switched between public and private libraries by a single key depression. Access may be controlled by password, by terminal identification, and by the display of appropriately restricted library menus.

The next position may be illustrated by the LEXIS and NEXIS systems themselves. These will be described in more detail in the next section, but a brief outline of the salient features will be useful here. This system offers public legal databases to users upon a contractual basis. Although terms may vary a little, the essence of the system is that subscribers are provided with a complete service including, access to the current databases, terminal hardware, software, documentation, training, maintenance and, most important of all, intensive customer service. It is made a condition that no one shall use the system who has not been trained to use it by the provider, that the system shall not be accessed except through the terminal equipment provided and that the service shall not be retailed for the benefit of others.

This philosophy may be contrasted with that adopted by the rival EUROLEX system. EUROLEX is also a legal information retrieval system giving access to databases of public legal source material. It too is made available only upon a contractual basis normally involving a subscription. Here however the system is envisaged much more as an indirect service for its users. Only a small proportion of the employees of a user firm are trained to use the system, and not all of these need be lawyers or librarians. No restrictions are placed upon the uses to which the system is put, so a subscriber is free to accept sub-contracted research. There is no insistence upon the use of a special terminal, and the service is generally made available through the ordinary public telecommunication services. This means that the service can be received on the same equipment which the firm may be using for some other functions such as word-processing, accounts or time-recording, and can also be used to secure access to other external databases.

Prestel exemplifies the next step towards a completely open system so far as publicly available information is concerned. Information made available to a closed user group is not fundamentally different in concept from EUROLEX. So far as the rest of the public information is concerned there is no subscription, no training and no control over databases. The subscriber does have to rent some special equipment, and does have to follow prescribed procedures.

The completely open position is illustrated by teletext services such as CEEFAX or ORACLE. Here there are not even any special charges, and an ordinary television set can be used without any expensive special modifications or attachments. The user has no contractual relationship with the database provider.

From this account of five different degrees of openness it can be seen that a number of different variables enter into consideration. Four factors which are subject to different degrees of constraint within the different examples are access to data, access to the system, identity of users and method of access to the system.

The first two examples differ in the access they offer to data. In the private library system only subscribers from the relevant firm even see the menu. Typically this position will be secured by specific contractual provision, and implemented by non-display of menus and generally by means of user identification.

The only difference between this constraint and constraint upon access to the system is that whereas the former distinction assumes both the group member and non-member are subscribers to the system, here the distinction is between those who have and who have not subscribed to the system. The means of accomplishing this will be fundamentally those mentioned above. This constraint may also seek to limit access by reference to a particular specified terminal.

Restriction of users is meant to imply the situation where only specifically trained and designated individuals are allowed to use the system. This feature too will be secured by the inclusion of a contractual term to that effect, and implemented by a system of passwords.

The final constraint mentioned above is one of the method of access to the system. Some features can, of course, be controlled by the unilateral actions of the system provider. He can decide when the service is to be offered, what software will govern interaction with the system and how the database will be organized. The sort of communication interface and the acceptability of terminal equipment can also influence the mode of use, as can the training and service offered to users.

It is no doubt possible to think of many more variables, but even if each of those mentioned above could exist in only one of two states there would be enough permutations to differentiate twenty-four different degrees of openness.

LEXIS

As stated earlier the LEXIS legal information retrieval system with which I am most familiar is one of the more closed systems, and it might be helpful to give an account of the system stressing the features which indicate that it is properly described as a closed system, and trying to explain the advantages which it is thought are secured thereby. While LEXIS is very well-known to lawyers it is, for some reason or other, much less well-known to the wider community of information scientists. This may be explained in part because it is a closed system, and not primarily aimed at either public or private librarians or information officers. It is however a large system. Its databases now amount to nearly thirty thousand million characters online; it conducts some twenty-five thousand searches a day; and it handles several hundred terminals simultaneously online from many different countries and continents.

Perhaps the first consideration should be the basic one of why such a system dealing overwhelmingly with data in the public domain, the primary sources of law, should choose to make itself available in a closed form at all. The answer to that is that it seeks to specialise in the satisfaction of one particular market for one particular type of information. It can by relying upon the expertise of those whom it is supplying improve the quality of the service. In the case of LEXIS it is, for example, able to assume familiarity with the style and general contents of the database. On the other hand because the user group is, in the terms of information science, a lay group, it has to simplify the terminal operation as far as possible.

This raises the next point which is that an open system is under considerable pressure to rely upon a very general communications protocol so that users can secure access through a variety of terminals. These will generally be terminals which are designed to perform a number of different functions. A number of consequences follow from that. First the terminal will not be optimised for any one particular function. For example if a terminal is to be used for word-processing and for information retrieval a compromise may have to be made on screen size. It also follows that the operation of the terminal is made one degree more difficult because either different functions have to be accomplished by the application of commands involving multiple key-depressions which is a potent source of error, induced partly by unfamiliarity with the codes because operated by occasional users, and partly by ham-handedness because operated by non-typists, or the different functions have to be accommodated by increasing the number of keys, which can lead to the terminal looking like the cockpit of a jumbo jet. On the other hand if a system is closed, a particular terminal design can be stipulated, or indeed supplied as a standard part of the service, as with LEXIS. In that case the terminal can be fitted with clearly labelled single-function keys. Even a lawyer can appreciate that a key labelled next case will, when depressed, move on to the next case. In this way many of the disadvantages of appealing to lay finders of information can be dissipated. The keys can, by their labelling, help to indicate the technique of searching. Equally the advantages of appealing to professional users of the information can be exploited, since the key-labelling can assume knowledge. There are, of course, other significant advantages in being able to use a custom-built terminal. By holding down the cost of production, by reducing the stock overhead for maintenance, and by simplifying maintenance, it becomes feasible for the service provider to perform these functions himself, thus ensuring much firmer control over the operation of the system and avoiding any need to finance the profit margins of third party suppliers and service companies. Yet another advantage is that it greatly simplifies the provision of enhancements to the system. To the extent that some improvements, say in baud rate, have to be implemented in hardware, it is clearly easier to design and accomplish them if only one standard terminal is involved, over which the designer has complete control.

As indicated above the LEXIS system is closed in the sense of being made available only to professional lawyers, cutting out on the one hand members of the general public, and on the other trained information scientists. Such concentration is dictated by the general philosophy of the system. This philosophy believes that the person best able to articulate the research need is the person who needs to do the research because he has to apply the result. In searching primary sources of law it might be thought that the client falls into this category as easily as the lawyer. This is not however the case because it is necessary for the lawyer to recast the client's problem into a form dictated by the organization of the law, which he, but not the client, has been trained to do. It is perhaps necessary at this time to diverge a little so as to explain the nature of legal research. The law is unique among professional disciplines in that its raw material consists of documents. The law *is* an arrangement of words in documents in a sense which is not true of any other area of study. For this reason a considerable part of legal education and of the stock in trade of the lawyer is concerned with techniques for finding the appropriate documents and words. Lawyers are rarely happy to delegate their research for this reason. A further feature of the law is that it is an artefact, and an artefact for guiding the actions of non-lawyers. This imposes considerable stress upon the resources of language which must be at once capable of being popularly understood and of being precise. The inevitable result is that appearances are often deceptive, and words acquire special, non-obvious meanings and nuances. Nor does the law stand still. It is in a constant state of flux. In itself this provides no special reason for lawyers to conduct their own research. It has, however, to be considered in relation to the degree which different areas of law interlock, sometimes implicitly. This means that the changes brought about by some developments are inherently uncertain and controversial, matters for the judgment of the trained lawyer apprised of a particular problem. For all of these reasons it is especially important that lawyers conduct legal research. This is just as true of research done with the aid of computerised legal information retrieval systems as that done with the aid of books. In the case of retrieval systems, at least those that concentrate on primary sources, the need is more acute. If research is done through a surrogate there are a number of obvious dangers. The first which is just as true of conventional research done through a surrogate is that the surrogate may misunderstand the problem either because the principal has failed to explain it properly, or because he has failed to follow the explanation correctly. A second is much more acute in computerized legal information retrieval systems. It should perhaps be made clear at this point that such systems are really not information retrieval systems at all, but rather document retrieval systems. This second danger is that in accepting the results obtained from the computer, the surrogate, in part because of his awareness of the first danger, may err on the side of being comprehensive. This is likely to waste everybody's time. A third danger is that the principal may himself have mis-formulated the problem, a fact which can only be recognized in the light of the responses received from the system, and which the principal is much more likely to recognize than the surrogate.

It is for reasons like these that LEXIS adopts its policy of restricting access to the system to legal professionals. A number of further features follow from this basic philosophy. Professional use is likely to be fostered only if the terminal is situated in some convenient spot, and if its technical response can be guaranteed. Together these considerations make the system truly accessible. Then again there is feedback into terminal provision. The terminal must be as reliable as possible, and subscribers must be encouraged to locate terminals as far as possible in the most convenient research locations. Fortunately these considerations reinforce the decision to support one common terminal. This facilitates not only terminal reliability, and minimises downtime, but also simplifies system communications. The decision about terminal location is a particularly vital one. LEXIS tries to make the decision as easy as possible by providing as one of its options as small and unobtrusive a terminal as possible. It would be better still to provide a completely portable terminal, though the need for reliance upon public telecommunications facilities complicates the development of such a device. It is also the case that part of the service concentrates on advising the user about terminal location before installation.

A further aspect of LEXIS, typical of a closed system, is that only trained users are permitted to have direct access to the system. This restriction is to some extent mitigated by a further condition that all relevant professionals in the firm shall be trained. The training concentrates on searching techniques, and really endeavours to give the users just enough expertise to get them started. It is hoped that then by constant practice in using the system confidence and skill will develop. This approach is further fostered by the practice of providing two hours of free use to every trained user. One of these hours is an hour which the user can use at his discretion and is subject to no limitation save that it must be taken within a given period of the user having been trained. This is simply designed to ensure that the user can use the hour to best advantage. The second hour which must also be taken within a certain period is subject to the further constraint that it has to be supervised by one of the LEXIS user support staff. The object of this is to give an opportunity to iron out any difficulties, and to establish a good relationship between the user and the member of the support staff. The availability of such free time, which can be quite valuable in firms with several hundred trained users, also encourages the firm to maximise the number of people trained to use the system. The reason for wishing to achieve such a result is precisely the one given above, that use by surrogates is inherently less satisfactory than use by legal principals. The same reasoning underlies the prohibition on accepting sub-contracted research. While it is true that both principal, that is the sub-contracting lawyer, and surrogate, that is the sub-contracted lawyer, will be professionally qualified, and one, the principal, will understand the problem thoroughly, and the other, the surrogate, will be a trained user, nevertheless there is the danger of failure of communication, and an over-cautious approach to the rejection of dubiously relevant material. This danger will be increased to the extent that communication between principal and surrogate is conducted remotely, by correspondence or by telephone for example.

The importance attached within this system to user support has already been mentioned. The philosophy of the system is that professional users must have constant reassurance. There seems to be no stable state. Either the user is on an upward spiral getting good results, and thus using the system more, and so developing skills which mean more efficient use and thus still better results; or the converse applies and he gets bad results, thus using the system less, which means less efficient use, and worse results. Such a downward spiral is difficult to reverse once it has started, so the job of the customer service representative is to try to ensure that it does not start, or if it does, to recognize it at as early a stage as possible. It will be appreciated that close support of this kind is really possible only within the confines of a relatively closed system.

Some peripheral advantages of closed systems

Most of the advantages mentioned above can be secured for a system most easily through the means of a subscription contract. The whole idea of contract is that it permits the parties to prescribe for themselves the terms by which they agree to be bound. Its negotiation thus provides a focus for thinking about the implications of taking a particular service. This should be of benefit to both sides. It is particularly important to clarify the primary obligations of the parties. Exactly what service is to be provided, for how long, at what price, and how can any of the provisions be changed? It is also prudent to consider secondary obligations. What will happen if something goes wrong, who will pay, and how much? It is also worth while to provide a machinery for the ascertainment of these matters to the extent that they are not made explicit in the contract itself. None of this can be done outside the ambit of the law of contract. Out there in the cold universality of the common law such matters must be extrapolated from a host of general provisions rooted in the pre-computer age, and interpreted by a profession, not self-evidently endowed with masterful appreciation of the latest advances in technology.

Because the contractual position leads to greater certainty, both of obligation and of liability it promotes commercial progress since risks can be assessed more accurately, and provided for, if need be, by insurance.

Recent developments in telecommunications and their impact on information services

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Following a reminder of what telecommunications involves the features and characteristics of various transmission media are reviewed. These comprise wire or cable media both metallic (twisted pairs and coaxial cable) and nonmetallic (optical fibres) as well as free space propagation methods such as TV broadcasting and microwave radio. The techniques in networking using these media are also discussed. Systems and services which, in their evolution are making use of the new developments in telecommunications, are described. These include videotex, teletext, CATV, the electronic directory, electronic mail and messaging, teleconferencing and telewriting, facsimile, networks and database handling. The impact these new developments, both technologies and resulting systems, are having on information services is examined from the point of view of user reactions, benefits, problems and effects. It is stressed that information services have become much broader in scope than has hitherto been understood by traditional library and information services and they now include services prepared specifically for the domestic and business markets.

Introduction

TO SET THE scene let us take the recent ACARD report[1] on information technology which considers information handling to comprise five stages—input, processing, storage, transmission and output. Despite the fact that there are new developments in all these stages[2] e.g. intelligent terminals and optical readers for input; faster processing and efficient manipulation; magnetic bubble and optical disk storage devices and LED displays and ink-jet printers, this paper restricts itself to and concentrates on the transmission or telecommunication stage.

The idea is that I should identify topics that are of particular interest and urgency *now* and present up-to-date statements of progress, development and prospects in these fields. There appear to be two ways in which this brief can be tackled. I could look at current information and library problems, e.g. document delivery or promotion of services and see how they are being resolved by telecommunications or I could look first at the current telecommunications scene and then go on to examine

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information developments which are almost a direct result of this telecommunication progress. The latter approach leads to a broader coverage or definition of information activities and will be the one followed here. An overview of this paper is given in Fig. 1. I am not going to give a complete catalogue of every service, network or system; instead I shall give certain examples to illustrate developments. Similarly, the list of references is indicative rather than exhaustive.

Recent telecommunication developments

coaxial cables
optical fibres
radio propagation
satellite transmission
digital techniques
compunications
packet-switching
data rates
intelligent nodes
facsimile transmission

Resulting systems/services

videotex
teletex
CATV
electronic directory
electronic mail
teleconferencing
document preparation and transfer
Euronet
VANs/LANs
database handling

Impact on information services

user reactions
benefits
problem areas
effects

FIG. 1 *Overview of paper*

Transmission technologies

According to *Time Magazine* telecommunications today involves microprocessors, the 'digitalization' of switching, the use of satellites, the electronic newspaper, with information being transmitted via the television screen either in a prearranged sequence or, at the customer's preference, through the public telephone network. It involves communications within a single office, between offices, branches, stores, within or between single towns, regions, countries, continents or even encompassing the entire globe. It involves the linking of mainframe computers of all sizes and capacities via telephone cables (copper or fiber optic), microwaves, satellites to terminals anywhere in the world; or within the office, to word processors facsimile and optical character recognition (OCR) devices, and copiers[3].

I do not propose to cover every one of these aspects nor shall I go into the basics of data communication in any depth—there are several good articles which explain it much better than I ever could[4,5,6,7]. I want, however, to say a little about how information is transmitted. The information may be in the form of sound (human voice, music) or it may be visual (printed page, microfilm, video picture) or it may be digital data. Whatever the form it must be converted to electrical signals (electromagnetic waves) before it can be transmitted over a given medium. Such signals very often cannot be sent over a channel as they are but must be modulated in some way to fit them to the carrying medium. The frequencies of the electromagnetic waves are normally radio frequencies which range from low frequencies capable of carrying only small amounts of information to millimeter waves, which can carry very large amounts. Above the radio frequencies lies light frequency, which can also be modulated to carry even larger amounts of information. In other words, the amount of information that can be sent over a given channel in a given time is dependent on the bandwidth. The bandwidth available increases with increasing carrier frequency. Thus, generally speaking the wider the bandwidth, the larger the amount of information which can be carried and the faster its speed.

A technique that is often used to interleave data so that they can be carried more efficiently in the same bandwidth is multiplexing. Multiplexing is similar to concentrating but replaces many lines with one transmission path of greater capacity[8]. Take a normal voice waveform per channel (line). If this signal is modulated and shifted to a higher frequency then a number of waveforms can be carried over a single channel. The number of waveforms so multiplexed depends on the size of the bandwidth of the channel. Some transmission paths, e.g. microwave radio, coaxial cable, optical fibers can carry many thousands of telephone channels. Fig. 2 gives an overview of some transmission channels in order of increasing bandwidth. It must be remembered that multiplexing is a sharing technique only. There is no increase in the total information than can be transmitted.

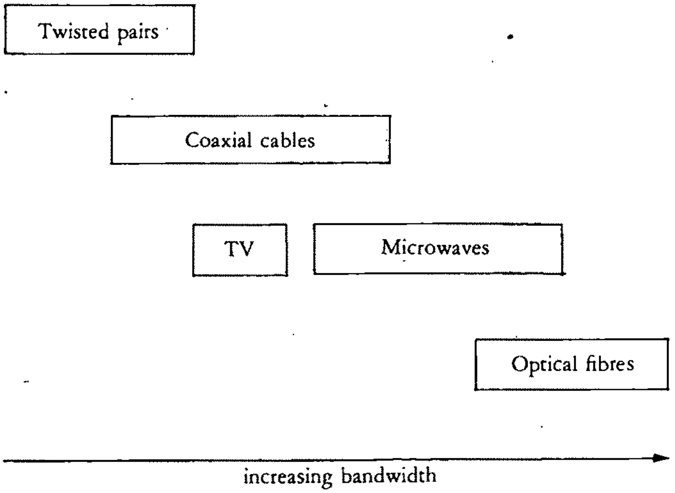

FIG. 2. *Relative position of various transmission channels*

Transmission media

The channels or media can be divided into two groups: line and free space (Fig. 3). In the line group we have two metallic media—twisted pairs and coaxial cables and one optical medium—glass or optical fibres. In the free space group we have radio propagation which includes broadcast (e.g. TV) and point to point (e.g. microwave signals). Let's consider these in a bit more detail.

Line media

- Metallic
  - twisted pairs
  - coaxial cables
- Optical
  - glass fibres

Free space media

- Broadcast
- Point to point

FIG. 3. *Transmission media*

Twisted pairs

Twisted pairs are familiar to us all as the copper wire telephone lines. Low frequency, they support a limited bandwidth (one voice channel) but can also be used for data communication at the lower speeds e.g. 300 bps. For higher speed or rates of data transfer 4-wire leased lines may be used. The problems associated with this transmission medium of copper wire are well known to you here—noise on the line, parity errors and so on.

A further problem with these lines is that data transmission in Europe, which has hitherto been essentially limited by the characteristics of the public telephone network which was suitable for narrow band traffic and terminal generated interactive operations requiring a relatively modest rate of information transfer, is shifting in emphasis to other information transmission services e.g. document delivery, videotex. To support such services a wider bandwidth is needed offering higher speeds and larger data volumes. However twisted pairs are being used in some local area networks and in W.-Germany signals from a variety of text and video devices have been sent in parallel with voice over a pair of ordinary copper telephone wires at 80 kb/s.

Coaxial cables

Another metallic medium, one offering a large bandwidth, is the coaxial cable. Coaxial cable transmission lines are not new having been used in telephone systems and radio and TV broadcasting for some years. However cable length has been relatively short and bandwidth small. As lines became longer and frequencies higher, so the wire (conductor) tended to act as an antenna and both radiated and received signals which interfered with the signals (e.g. television) being carried. This problem was resolved by there being two wires or conductors—a 'balanced' arrangement—which cancelled out the interfering radiation one from another. The coaxial cable goes one stage further and consists of the two conductors located one inside the other. Their protection however does not prevent some loss in the system.

There are two types of coaxial cable—the baseband and the broadband. Baseband uses digital transmission and is suitable for fairly short distances. It has a data rate of about 50 Mb/s in half-duplex. Broadband coaxial cable on the other hand is more familiar as CATV and is suitable for longer distances (up to 15 km) and can support data rates of over 100 Mb/s. Coaxial cables, with their better electrical properties, can transmit at much higher frequencies and support wider bandwidths than the twisted pairs. They are suitable, therefore, for high quality bulk transmission of data at high speeds as well as text, picture and voice. One such cable can support the equivalent of up to 10800 telephone (voice) channels.

Optical fibres

Coaxial cables do however have several limitations as a broadband transmission medium which can be overcome by the use of optical fibres which carry light waves (representing electrical impulses) by the principle of internal reflection. Optical fibres have a number of factors going for them including an even wider bandwidth; low error rates and low transmission loss due to immunity to electromagnetic interference; small diameter; light-weight; easy bending; ability to handle voice, data and picture information and their cost effectiveness in general[9]. Transmission can be made up to about 10 km and at data rates of around 45 Mb/s though tests have been carried out at over 700 Mb/s. The medium's main disadvantage is that, unlike twisted pairs and coaxial cables, it cannot easily be tapped for multidrop or spur connections. There are several optical communication systems under trial—for telephonic communication in Britain, Berlin and Paris and in Japan where fibre optic links provide a community-wide video information service and in Canada where besides TV and radio channels other services such as remote metering, alarm forwarding, energy load management will also be provided.

Free space media

The previous three transmission systems relied on a physical line. There is however another medium—that of free space through which radio waves can be sent. Microwave radio is a broadband facility able to carry several thousand channels. As such it is suitable for bulk transmission of data over long distances. As with all systems that transmit through free space the signals are subject to fading caused by absorption and scattering from moisture and precipitation in the air. A further factor is that the microwave system requires line of sight transmission between two relay towers. Another free space radio transmission system is the broadcasting of TV signals which are picked up by antennas and converted back to pictures and text for display on the television set.

These radio signals can be helped along by satellites, which in effect act as repeaters and allow signals to be transmitted over even greater distances and higher frequencies. The satellite is usually placed in a synchronous orbit (36,000 km high) where it remains at the same point in the sky with respect to the earth. The use of satellites as a transmission medium is not new—communication satellites have been broadcasting educational TV programmes to India and used for transatlantic telephone calls and so on for some years. But it is only recently that they are becoming used for the high speed, bulk transmission of data over large distances.

Choice of medium

All the transmission channels above can be used as point to point connections or as broadcast systems. Pelton describes it succinctly. Transmitting information electronically or photonically is considered in two aspects—telecommunications and broadcasting[10]. The former is a direct interchange of information within limited groups of 'talkers' and 'listeners' (which may be terminals or computers as well as people). Thus there is a certain amount of interaction. Broadcasting is the mass distribution of information to large markets with one 'talker' and many 'listeners' and no real interaction. The telephone is of course telecommunication while TV and radio are broadcast. Because of the increasing linking up of the two forms with computers the traditional distinction is being blurred and now you get systems like electronic mail which can either be broadcast or telecommunications and cable-TV broadcasting systems which can carry telecommunications. And any given transmission circuit could be made up of a mixture of say terrestrial microwaves, cable and satellite links[11]. Thus a given service could be transmitted over more than one type of channel. For example a television programme can be broadcast let's say normally—as you get it at home; via satellite or via broadband coaxial cable using radio frequency.

The decision on which medium to use is determined by such factors as the distance involved, the area to be covered and the type of information to be sent. For example terrestrial microwave radio transmission requires line of sight communication and for long distances repeaters must be added. If the medium has to accommodate video or high speed data then a broad bandwidth such as is provided by satellite and coaxial fibre optical cables will be required.

Digital techniques

Modern transmission services must handle a number of varied and evolving requirements including a wide range of data signalling rates, high utilization of the transmission path and security of the information transmitted. Nearly all the recently developed transmission media are being modified and adapted to digital transmission rather than analogue and a feature of newer transmission technologies such as communication satellites and optical fibres is that they have been designed for digital transmission from the start. Why is this? There are several reasons. One is that it is generally recognized that there is a convergence of computers and telecommunications both sharing the same kind of logic, storage, switching and transmission capabilities. Computers tend to use digital techniques, thus it causes fewer problems if telecommunication technologies also use digital techniques. Another reason is that in a digital transmission system, the signal can be regenerated many times to eliminate the noise and distortion which would otherwise accumulate. Also, channel utilization can be increased by time-interleaving (multiplexing) different types of signal such as voice/video which have been digitized.

Networking

Circuit and packet switching

For the developments mentioned above to be used widely a network or linking mechanism is needed and several new types of network are becoming available[12]. Telecommunication networks have of course been in existence for a great many years. For voice communication circuit switching is the norm whereby a path through connected circuits is established. While this method is suited to telephone traffic it is not so economical or efficient for data which is transmitted at different bit rates and in varying amounts. To meet these requirements leased line or dedicated networks were made available but these are becoming displaced in favour of packet-switched networks. Whereas circuit switched networks handle information as a continuous data stream, packet-switched networks consider the information to be a sequence of digital messages which can be split up into segments or packets and which are then transmitted or forwarded to the receiver along the most efficient or appropriate path which may not be the same for all the packets.

The advantages of packet switching include transmission economies because of shared line utilization; high quality, error-reduced service; and the facilities for speed changing and procedures conversion thus allowing communication between different types of terminals and the interconnection of networks. Even though the transmission might be made via cable, satellite or microwave it is still possible to send data by packet. One recent development in network design is the concept of the 'gateway' which allows third party host computers into a network[13].

Trials have been made with Euronet to allow connection of videotex terminals to Diane hosts and TTY terminals to access videotex computers[14]. Local area networks (LANs) such as Xerox's Ethernet also have gateways to permit access to other networks.

Network intelligence

The addition of computers, of course, leads to much wider facilities and then it becomes difficult to know when computer stops and communications starts—so much so that a new word 'compunications' has been coined by the Americans. Computers and networks permit distributed databases and many of the things we mentioned above. In fact packet-switching was developed specially for the task of communication between computers, intelligent terminals and concentrators[8]. The latter will be familiar to you if you are a user of the IRS information system. A concentrator accepts traffic from a number of lines both high and/or low speed and places it on a common (normally high speed) line. In the return direction it distributes the incoming data from the common line to the other local lines. These concentrators are becoming more sophisticated and intelligent as can be seen from the new PTT nodes in Stockholm and Madrid which handle traffic for a number of different networks both local and international. Sanden[15] has listed a number of desirable features of what he calls a universal dialogue service. These are fast connection link-up, high transmission rates, combined communication (voice, data, still picture, text) dialogue with pauses and specific intelligent text and data services.

Data rates

The connection set-up speed for packet switched networks is not quite so fast as for circuit-switched, but regarding transmission rates it is interesting to note that there is a trend towards the use of higher transmission rates—particularly 9.6 Kb/s and that the speeds which the majority of the information community is at present using i.e. 300 and 1,200 bps. are declining in popularity[16]. The gradual digitalization of the telephone network has led to a recommendation that the signalling rate should be 64 Kb/s for digital voice and this rate is then an obvious choice for use between terminals in an all digital network. Although it is interesting to note that in trials for the digital local network in W.-Germany, teletypewriter, teletex and videotex signals have been transmitted over twisted pairs in parallel with voice at 80 Kb/s rather than the 64 Kb/s. The extra 16 Kb/s is occupied by an 8 Kb/s channel for the non-voice services and the remaining 8 Kb/s for remote signal exchange and synchronization characters. In due course it is anticipated to place the facility on fibre optic links. Local area networks do commonly use speeds much higher than 64 Kb/s for the connection of diverse office equipment[17].

Hardware

These new technologies in telecommunications have led, inevitably, to new developments in equipment and facilities for creating, accessing, storing and retrieving information as well as distributing it.

There are private automatic branch exchanges (PABX), gateways, transceivers which combine the functions of a transmitter and a receiver, but these developments are outside the scope of this paper although I could just mention a French databus which can connect up to 32 devices such as video cassette recorders, teletext decoders etc. via a 21 pin connector on a TV set and the development in England of an electronic black box which would enable many different kinds of text handling machines—telex, facsimile, word processors, VDUs, TTYs or Prestel sets—to communicate with each other.

Systems and services

Having talked about some of the new developments in transmission technology, let us look at some of the systems and services evolving which are making use of these developments[18,19].

What follows is not in any particular order of evolution or importance, and it must be remembered that a given system may use several of the transmission paths discussed earlier and may transmit more than one type of service. An overview of systems/services used to any extent in September 1981 is given in Fig. 4.

Videotex

One of the most prominent developments using telecommunication technology has been that of videotex or viewdata as it is known in England. Videotex is a two-way interactive, telephone based system linking computers to TV sets which display alphanumeric information. It has its origins in the UK in the mid-1970's and evolved to Prestel which is the basis of systems used in several other countries too, although

Where used	*Libraries*	*Homes*	*Business*	*Services*	*Educational*
System					
videotex	v	v	v	v	(v)
teletex	v	v	v	v	(v)
fax		(v)	v	v	
CATV		v			v
VANs	v		v	v	v
LANs			v	v	
networking	v		v	v	v
Media					
twisted pairs	v	v	v	v	v
coax cables		v	v	v	v
fibre optic links		v	(v)		
microwave radio			v	v	
satellite transmissions		v	v		v
Services					
document delivery			v	v	
online ordering	v	v	v	v	
electronic directory		v	v	v	
teleconferencing		(v)	v		
telewriting			v		v
electronic mail			v	v	
database handling	v		v		
electronic messaging		v	v	v	
community information		v			
news/business information		v	v	v	
recreational information		v			
information provider	v		v	v	

FIG. 4. *Overview of systems/services used to any extent in September 1981*

Note: (v) = trial situations, v = in use

some nations, notably France and Canada (and Japan!) have developed their own system and standards. In a way, it's almost the same as using Lockheed or IRS—you dial a local phone number, but instead of getting the information on an ordinary terminal, you get it on your TV set (and in colour if you have a colour set). You have a different kind of keyboard too, with which you can ask for page numbers containing the relevant text. The method of retrieval is such that the user works through indexes in a tree structure where he is gradually led, page by page, to the information he is seeking. The data is normally transmitted at 1200 bps to the terminal while the input speed is 75 bps. Videotex can be transmitted over various of the telecommunication media—wire pairs, coaxial cable, satellite and fibre optic links[20].

Videotex systems such as Prestel in the UK, Télétel in France, Bildschirmtext in Germany all provide essentially the same kind of information namely local, national and international news, travel information, weather, traffic news, financial details, stock market reports, where to go, what to do—basically look-up, factual data which is updated regularly[21]. In the USA the Green Thumb project provides information for the farming community (most popular items are market information—future price of soybeans—and weather!)[22]. Despite the fact that this is really business information one could argue that it is domestic use since the farmer's terminal is in his home. Videotex terminals are also installed in banks, stores, travel agents, for transaction purposes as well as for database searching for commodity reports, states of the market, seat availability etc. In the UK nearly 9,000 businesses use Prestel.

In libraries of course it can offer a friendly, up-to-date, easy to read alternative to the attended information desk, information phone service, brochures and so on. There have been at least two major trials in the U.K. (Aslib and BL/LASER) with public libraries using Prestel sets as reference tools and with the libraries even acting as information providers for local government community information in some cases. Viewdata terminals are also being tested in Dutch government ministery libraries.

In the U.S.A., OCLC have tested Channel 2000 which among other services provides library catalogue data to domestic users. Using their TV sets and keyboards users could also contact libraries to reserve books, make quick reference queries, pay overdue fines and so on.

Libraries and information bodies, by becoming information providers, can then actively promote their services to users to the viewers in the home. It gives them another medium by which to advertise and they can provide a list of best sellers, subject groups, book at bed time, references and so on. This, however, does not seem to be an application at present.

Teletext

Another system where you also get alphanumeric information on your television set is teletext. Teletext is a narrow-band service whereby digital data is inserted into the unused lines of the blanking fields of TV signals which are then transmitted or broadcast to the user's TV set. Decoders in ordinary domestic TV receivers extract, store and decode the data into words, figures, diagrams etc. which then appear on the screen.[23] The system is complementary to videotex though it has a much smaller information capacity. In fact it tends to provide brief news item-type data rather than detailed stable data. Its advantage is that it can carry bang up to date information instantly to a vast community without any inconvenience to any other user. With teletex systems too a box can be cut into the screen while the user is watching a programme to give him the latest news. The same mechanism can be used for subtitling. Such teletex services are one-way and non-interactive—the information being transmitted continuously with the user pulling off the appropriate page as and when he/she needs it.

In France, we find there are some 11 teletext services available (Antiope-Services)[24] such as Antiope-Méteo which gives weather in France and elsewhere, conditions for yachting, flying, climbing etc.; or Antiope-Poste where customers of ten Parisian post-offices can consult a magazine on the latest postal news, PTT jobs, recent philatelic events etc. In Belfast Public Library a teletext receiver is available in the Reference Section for use by the ordinary public as well as library staff.

CATV

One other development which uses the domestic TV set is cable television (CATV) which is rapidly gaining ground. Originally intended as a means of providing TV in remote regions where signal reception was weak or non-existent, CATV has grown partly because of its much wider bandwidth, which means that it can offer much more than just rebroadcasting programmes off-the-air, and at higher speeds. What normally happens is that the TV signals are picked up by antennas on tall towers in good reception areas and distributed to subscribers' homes by coaxial cable. Besides being able to show what we would call normal TV programs, videotex and teletext services can also be transmitted over the cable. Furthermore the medium lends itself to two-way communication and a host of other services.[25]

A predominantly coaxial cable system is the Community Communication Information System (CCIS) in Tama New Town outside Tokyo for which trials started in 1976 and ended in 1980. Ten different services were initially provided including TV retransmission of 7 VHF and 1UHF channels; local origin TV programmes; two-way interactive broadcast and response service; pay TV; still picture request service; flash information; a facsimile newspaper service; memo copy and home printers. The bulk of the information was transmitted via coaxial cable, though twisted wire pairs were used for the interactive terminal and the memo copy and printing services. In addition there was radio transmission of the facsimile newspaper from the publisher in Tokyo to the reception centre in Tama.[26]

Also in Japan, an interesting variation is that of the Hi-OVIS system, where fibre optic links are used. Here the user can get programs, news, weather, community information etc. on demand, at any time due to a video recording facility. In addition the provision of a camera and microphone gives the system an interactive teleconferencing facility which enables the user to take part in live studio discussions, local council or PTA meetings—all from the comfort of his own home.[27]

Another interesting fibre optic trial is starting about now in Elie-St. Eustache, Manitoba, where an improved service will be offered to the community providing voice, data, video and FM radio interactive facilities. In fact there will be 9 TV channels, 7 FM radio channels, 2 independent video channels, telephone channels and a 56 k bit data channel. Five basic categories of service are to be provided: remote metering of utilities; alarm forwarding; energy load management; broadband services such as pay TV, educational TV, shopping and community services; and personal and business data where such things as government services, educational services, business information, health information and transport information will be provided by Telidon videotex.[28]

Electronic directory

One further TV based domestic and business information development as a result of new telecommunications technology and policy is the electronic directory in France. This is a service whereby the conventional printed telephone directories are being replaced in a subscriber's home by a small black and white TV set. The directory, in machine readable form, is accessible via the terminal by a number of keys including name, address, occupation or trade, synonyms and so on. Advertisements and maps will also be available. Already tested in St. Malo, the service is now under trial in the

Ile et Vilain region with 1,500 users and terminals will eventually be distributed throughout France, free of charge. This will apparently still work out cheaper in the long run than printing the directories. The U.S.A. is also considering installing the system.

Electronic mail and messaging

The need to send messages speedily and accurately has led to the development of enhanced telex systems which are variously known as teletex, electronic mail, electronic messaging or office teletyping. Subtle differences have been drawn between electronic mail and electronic messaging—the former being a PTT dominated partial replacement of the postal services, while the latter is more a storage and retrieval system for messages which may or may not include message forwarding. Often lumped in here too are communication word processor systems which allow the storage, retrieval and manipulation of texts by a number of remote users. Some writers also include facsimile communication in electronic mail descriptions[29] though in this paper it is treated separately.

Such systems tend to offer the complete character set of office typewriter keyboards for the preparation, storage, retrieval, editing and transmission of texts or addressed messages between communicating stations at speeds of up to 2400/bps. Electronic messaging systems also allow store and forward facilities, direct and delayed communication, multi-destination addressing as well as automatic filing. At present while there are localized packet-switched electronic messaging systems, teletex is not yet widely available on a national scale although several European countries are fast approaching it.[30]

In the Netherlands, just announced is Vidibus, billed as the first in Europe, which allows the user to send and receive messages from his Viditel (videotex) terminal in either standard form or free text form. What is unique is that the user can be informed at logon time in red letters whether any messages are waiting for him. If one arrives during the time he is working, then a flash comes just before he logs off. Obviously a forerunner of telecomputer conferencing.

In the electronic mail field there have been large strides with the development of a number of networks which are either already in operation or due to start shortly,[31] like the Xerox Xten network which is a digital communication packet switching network using terrestrial microwave, cable and satellite transmission with store and forward facilities and message retrieval. (Xerox have just announced that this project has been abandoned on economic (not technical) grounds. ACS (Advanced Communication Service) is also a packet switched network with electronic text editing facilities where users have conceptual areas for message editing. Then there is the SBS satellite launched at the end of 1980 which offers its clientele the facilities for high speed transmission of computer data, telephone calls, teleconferencing, interoffice memo exchange and digital fax copiers which can transmit several thousand pages per hour to other copiers. It is thus an integrated voice, data and image service. The electronic messaging systems can be incorporated into local area networks (LAN) such as Xerox's Ethernet which is a contention based (no central computer) coaxial cable communication system connecting various types of office equipment in a single building or building complex.[32] Mitre Corporation's Mitrenet shares the same basic bus design of Ethernet, but in contrast to the latter's baseband digital transmission, Mitrenet is a broadband system using radio frequencies transmission over CATV coaxial cables. It in fact uses two cables, thus permitting handling of video and audio signals as well as data transmission. Both networks support gateways to other networks such as Telenet and Tymnet etc.

It is easy to see how these essentially business information uses can be extended to the traditional library information uses. Applications in libraries include online ordering, document delivery and information transfer avoiding phone request for information and paper requests for documents. Time zones can be ignored and there can be automatic generation of paper copies of request and confirmation of receipt as well as order, billing and payment details.

Teleconferencing and telewriting

Teleconferencing is enhanced communication between two or more individuals and teleconferencing systems range from simple audio facilities to a full complement of conference support facilities including high speed document transfer, integrated graphics projection and computer aided information transfer and retrieval.[33] Teleconferencing allows remote users, by means of cameras and microphones linked by satellite or cable to interact with each other thus saving travel costs (what about the pleasures of being there!?). Teleconferencing can be extended to include computers (sometimes known as computer conferencing) where messages or comments on papers can then be entered, logged, stored and retrieved and commented upon at will. This has the additional advantage that time zones can be overcome since the participants do not need to be present at the same time.

Another kind of message sending development is the telewriter, which enables users to write electronically over the phone with the words/pictures being reproduced on a VDU or TV at the other end. Various methods of input are available such as light pens or pressure sensitive pads. Used in France, Britain and elsewhere it has multi-destination capabilities and can be used for teaching—the electronic blackboard—to a large number of separated students.[34] The British system known as Cyclops also allows voice to be transmitted too, thus enhancing its teaching applications. The French system also permits colours and graphs to be drawn.

Facsimile

One of the problems with the systems and services so far described is that they transmit text, data or pictures (soft copies) but they don't give you hard copies that are faithful reproductions of the original. To help circumvent this problem facsimile communication has been introduced which enables a page of text or graphics to be scanned and transmitted via terrestrial or satellite links to a remote location.

While extremely valuable there are a number of disadvantages to this method—incompatibility of machines being one and scanning from single sheets being another, not to mention poor reproduction quality and time spent in scanning informationless areas. Advantages, though, include the flexibility of non-coded printed information and graphics and a speed that is far superior to mail. Facsimile communications is developing rapidly with 3 speed groups already available (group III permits the transmission of an A4 sheet in 1 minute at 4,800 bps) and a fourth on the way.

Fax can be transmitted analog or digitally via circuit- or packet-switched networks. In addition instead of just being a means of copy transfer from one station to another it is expanding to include store and forward capabilities and network, multi-destination characteristics.[35] Using facsimile a number of services have sprung up both nationally and internationally. In Holland, for example, the Dutch PTT has introduced 3 facsimile postal services, one of which links more than 200 post offices between which messages, letters, single sheets can be sent. Sending documents abroad by facsimile is also possible with the British Bureaufax system. Document copy received at the Bureaufax office will be transmitted by high speed fax (group II) to similar bureaux abroad and then sent to the final destination by local delivery. A similar system is INTELPOST at present on trial in the Netherlands. INTELPOST is an international service whereby A4 documents are transmitted digitally via cable and satellite between the regions of Amsterdam, London and Toronto. It is already available between Canada and the U.S.A. The experimental service can handle all kinds of text including graphics and handwriting. Colour can be sent but is output at the moment only in black and white.

In Japan two facsimile units designed for use with the domestic TV set and telephone are under consideration. One transmits analog fax documents on a second audio subchannel and will be on trial next year, while the second receives digital broadcast material inserted on two horizontal lines of the TV signal during the vertical blanking interval. The Tama CCIS system, already mentioned also made use of a home fax machine.

Networks

Based on the new technologies and concepts different types of networks have come into being such as the Value Added Network (VAN) which as defined by British Telecom is a line leased from a common carrier by a private operator who then adds special terminal equipment or conditions the line so that it can sustain a specialized service, such as high-speed fax or data which it then offers to the public. Services on VANs include information retrieval, timesharing, electronic mail, electronic fund transfer, reservation and videotex. Euronet—a value added network has evolved out of the requirement for a common European communication network and it incorporates the latest technology i.e. packet switching. I'll spare you yet another description of what Euronet is and does, but it is interesting to note that the network is being considered a carrier for other than the normal I and D TTY-type information. In fact it is feasible to allow access to Diane hosts from videotex TV terminals via the network.[14] Another use to which Euronet could be put is that of online ordering, interlibrary loan, and document delivery. Online ordering via a network is still relatively new, though most of the larger hosts—LIS, SDC, IRS have it. It means that a user can order a document from his terminal, though at present the actual document will be sent to him by mail rather than electronically.

However there are a number of experiments taking place or being considered which would allow the document to be scanned (by a variety of techniques) and digitized, and then be transmitted digitally upon request to the user. The AD Little Artemis study assumed Euronet would be the medium over which the documents would be sent—though of course there is no reason why satellite links could not be used instead or as well.[36] In Europe a major initiative is just being undertaken by a group of publishers who intend to launch Adonis (Article Delivery Over Network Information Systems) in 1984.

Another information network is Scannet covering the Nordic countries which has a number of hosts connected and which is being considered for other services such as online ordering, document delivery, interlibrary loan, videotex and electronic mail.

Telecommunication networks are of course also being used for library resource sharing. Epstein[37] distinguishes 3 types of online library network including search service networks e.g. Euronet for accessing data bases of the LIS and IRS type; and customized service networks which provide bibliographical files for users to search, retrieve and modify individual records for their own local use to obtain a variety of printed and machine-readable products showing this localized data. The most widely known of these networks are those handling cataloguing and interlibrary loan/union catalogue.

Another new type of network is the LAN—Local Area Network—which as the name implies, offers communication facilities within a given area, say a single office building complex.[17, 32] They have evolved because it is not cost effective to connect all computers and terminals in one big global network.[38] The limited geographic area means that very high speeds can be attained for data transfer and the network can be used for word processing applications such as text preparation and editing as well as for electronic mail or packet transfer of messages between the connected work stations. There are various configurations and several ideas of who or what actually controls the network.[39]

Kitahara[40] argues that since man acquires 70–80% of his information through the visual senses then the information society of the future needs to promote telecommunication services around visual non-telephone systems. We have already seen some of these systems—CATV, videotex, teletext, facsimile—but they are separate systems or networks. What is needed is an integrated services data network (ISDN) which is a public end to end digital telecommunication network providing a wide range of user applications.[41] Such a network will foster economies and flexibility because signals for various kinds of information service which can be offered can be digitized, thus the network can carry voice, data, fax and video in one transparent medium. The ISDN is not here yet, but the building blocks are already there—digital data packet-switched circuits, public fax networks, digital phone networks. They should be integrated into one network in the next 2 or 3 years.

Database handling

The final aspect I shall cover here is what I have loosely called database handling. Included in this category are database updating, file transfer, distributed databases, provision of cataloguing records, current awareness profile dissemination and electronic publishing. All these involve the bulk transfer of information. Satellite links offer some advantages because of their ability to handle large volumes of data at high speeds thus they can bridge distances very quickly and they can transmit the information to multiple destinations.[42, 43] Because they can also handle large amounts of data, optical fibre links can also be considered for such use. In a previous paper[36] some details are given of the aspects and possibilities involved in database handling and it probably serves no real purpose to repeat them here to what is possibly largely the same audience! Maybe, though, I will just emphasize that these newer transmission technologies make the transferability of large amounts of data, such as documents, much easier. Coupled with modern word processor techniques, documents can be converted to digital form which can then be easily stored and manipulated for the speedy drafting, editing and revision of texts. These texts can then be transferred rapidly between authors, publishers, referees, between publishers and database producers or libraries on a point-to-point or a multi-destination basis and over a wide range of media. The Commission of the European Communities sponsored a conference on just this subject last December.[44]

Impact on information services

So far we have discussed the various transmission technologies, described systems which have evolved as a result of these technologies, and looked at some specific services which have been developed using these systems. It remains for us to see what impact they are having on information services. We will look at this from four aspects: user reactions; benefits; problems and effects.

User reactions

In Japan users of the Hi-OVIS system feel that their system gives them a sense of involvement in community affairs. Over 30% of the users said they had met new friends and acquaintances as a result of the experiment and that they were given conversation topics and that they started to talk with their neighbours more. These events tended to bring the community life closer. Some 40% were willing to take part in the planning and production of programmes, while many found that the two-way service was an enjoyable experience and helped them overcome their shyness.

CCIS claims to provide the world's first corroborative data on the feasibility of social acceptance for new media. According to its study the most frequently used services were the home printer and memo copy because instant records could be made and kept; locally originated broadcasts and flash information. Interestingly enough the two-way interactive service was not rated too highly—possibly because it provided no camera as in Hi-OVIS. In general users felt that the system increased exchanges between neighbours, was very useful for daily living and most of all, was interesting because familiar people living nearby appeared in the programmes.

OCLC has recently conducted a survey of use and attitudes of a viewdata test system, Channel 2000, by 200 households in Columbus, Ohio. The system covered a number of services, but the most useful were Video Catalog—a computerized version of the Public Library of Columbus and Franklin County catalogue; the Video Encyclopedia containing the full text of the Academic American Encyclopedia; and the Public Information Service containing details of local employment, services, utilities, sports etc. Library services rated fourth in a list of hypothetical services which could be offered and for which users were willing to pay $3/month. 46% thought the system saved them time in getting books from the library and 41% said the system increased their knowledge of library services. Apparently, book ordering via the system was also popular.[45]

These comments and reactions seem to put to rest the fears expressed by Cawkell who considered that there would be a reduction in conversation and a general lessening of social contact, discussion and controversy.[46] Certainly, the Hi-OVIS system with its microphone and camera actively allows a person to take part in community life with face to face contact (albeit once removed) as do the teleconferencing and computer conferencing facilities. However, to be fair one must present the other side of the coin. According to press reports the French are unenthusiastic over their new telecom services. The French research organization, IREST, discovered that the services like public and home facsimile, home computers, videotex were not so important to the public. Furthermore, the French users association (AFUTT) has strongly attacked the electronic directory service on grounds of cost and that the terminals will be difficult to use.[47] Note however, that fully 85% of users in the OCLC study said it was easy to learn how to use their terminals.

Benefits

Many of the benefits hold good whether you're a domestic, business or library user. It has become easier to get a wide variety of information, often from a single source. It's easier to send messages. The user can stay at home or in his office to do transactions—ticket reservation, time-table look-up, directory look-up, find out what's on where, to do shopping, to take part in the PTA meeting, to type, edit and send that memo to your colleague miles away. Thus it is convenient and quick—a little impersonal maybe, but accurate. The right information can be obtained at the right time, in the right place and at the right cost.

This last point—cost—is arguable in a way. For teletext the information is to all intents and purposes free of charge since you pay anyway for the electricity and TV licence (decoder is an extra, but then so is a colour TV).

With videotex you pay per page—on the other hand you don't necessarily need to buy the newspaper or 'Whats On' etc. (in some countries: e.g. Netherlands local newspapers giving local news and events are distributed free). The French are apparently expected to pay for each enquiry they make of the electronic directory when they could look it up free in the paper version. But they get the terminals free of charge and these can be used for other services. The Japanese are willing to pay a subscription of between $43–86 and a monthly fee of $2–4 for using CCIS. Users of Channel 2000 are willing to pay $3/month. And in the Netherlands there is a compulsory charge of $3/month for the privilege of having CATV in The Hague. Euronet has brought about a reduction in the tariffs for accessing online databases and in several countries charges for accessing the computer over telephone lines are distance independent.

True, libraries and information services have traditionally provided information free, but if you want your own copy of 'What's on in London' or the 'Railway timetable' or a telephone directory other than the local one you're entitled to then you must pay for it.

Certain social factors are increasing the utilization of these systems. These include more working from home (the electronic cottage); the increase in single parent families or families in which both parents work which is leading to an emphasis on time saving services; shorter working hours leading to an increase in leisure time and the desire to watch TV or play electronic games or browse for things to do and places to go.[48, 49]

Another benefit is that people become more skilful when they can use such systems and switch from one to another. Mahon believes that telecommunication networks are here to stay, that they will be used by more and more people for all sorts of things mostly concerned with information and that they need intelligence applied to them by the end user.[50]

Problem areas

As with any new service there are various issues of concern to the information society involving these new telecommunication techniques. I'm not going to discuss them all—many will be familiar to you. There's the vulnerability of computers to outside tapping, transborder flow of information and lack of control (things pointed out by Nora and Minc[51]), problems of security and privacy; problems of copyright, misuse of information. Several countries, for example Norway, have spent much time discussing the ethics and legal aspects of the new telecommunication services thus delaying their introduction. What are the economics? How should we charge? All problem areas.

There are new communication services and systems being announced continuously. Lack of orderly development and operation means that there will be fragmentary development of private networks and services with no framework to ensure compatibility between different implementations.[52] In the U.K., the ACARD report[1] stated that information technology is divided between various government ministers and departments e.g. British Telecom/PO, D.I., Dept. of Education etc. and recommended there should be one Minister to coordinate it all. As a result an Information Technology Minister was set up in the Department of Industry. In France, as an outcome of the Nora and Minc report, we see the Télématique programme as a positive, controlled attempt of a country to turn itself into an information society in the digital sense.[53] Japan has made a similar study and some of its efforts have already been described.

One further problem with the introduction of certain services is the attitudes of the various groups involved, for example the PTTs, which because of their monopolistic position, are loathe to allow other parties to offer competitive services. There is evidence, however, that the situation is being eased, at least in so far as the U.K. is concerned.[1, 54, 55] Also there is a certain reticence by users, libraries, to get involved with new technology. Lack of government or local government support for, for example, community information services is also apparently hampering development in Britain, unlike say in Canada, France or Japan.

Standardization is another problem on an international level. Videotex has virtually 3 standards for roman character sets—Prestel (U.K.), Antiope (France) and Telidon (Canada). Happily, the CEPT has recently agreed an alphamosaic standard based on the best features of Prestel/Bildschirmtext and Antiope. But the different systems are still fighting for the U.S. market. There are still several outstanding topics to be discussed by the various bodies involved with local area networks standards.[17]

Even benefits can be made into problems. Sit at home too long twiddling your keyboard and you'll become fat and lazy. However, this novelty aspect will soon wear off and people will want to get the exercise and human contact of going out!

The change of skills required as society becomes more technically oriented and steeped in traditional library/information matters such as how information is acquired, indexed, stored, retrieved and transmitted will mean that users must be trained and educated in a different way. To the question, therefore, will the librarian/information officer—the intermediary—be done out of a job by these new services, we can reply—not necessarily! Much of the information provided by these new services is not the kind of information that libraries supply. Of course they will have reference books, newspapers and local events files, but these are hardly the things that keep the library in business. And anyway the librarian/information officer, being the information specialist, has a role to play in using his experience, knowledge and expertise to teach the end user how to use the services for himself. In addition, this expertise can be brought to bear in the design of databases—their contents, searchable fields—(as Aslib is doing) and in the design of more efficient indexing and retrieval modules.

Effects

The new technology and the resulting services are having several effects on libraries and information centres. Library budgets are having to be increased to take into account the new equipment required (e.g. viewdata terminal), associated page charges and communication costs. It is unfortunate that at present existing terminals used for online information retrieval cannot be used for videotex applications.

In addition staff are having to learn new skills, new techniques—videotex searching is not quite the same as online IR—the databases are different too. This places an added burden or work-load on the staff who are required to operate these systems, or help users operate them. Furthermore additional records will need to be kept of use involving checking and payment.

Different promotional strategies are also needing to be made. New technology, new services call for new techniques. The kind of information provided is in such a different form that it requires much gentle persuasion to get users to change.

No matter whether the information provider is primarily library, business or domestic oriented and no matter who the user, there are certain implications for the provider. The information needs to be packaged and presented nicely, attractively and it needs to be properly and effectively promoted or marketed. Even, or especially, libraries need to be aware of this. The impact on the traditional information community or industries is at present small, but the impact on the information society is far greater. The impact on the information services themselves is also great because the information is being provided in a different form and by a different media. Basically it's the same information, but it is being made available in a quicker, usually more convenient manner, perhaps at greater monetary cost in some instances, but then there are the trade-offs between saving users' time and energy and effort etc.

Savings will not be made by giving up abstract journals or the like since libraries will probably still need to subscribe to ensure a complete collection in the likely event that eventually earlier years will be taken off online systems because of storage limitations.

Other services are being affected too particularly the interlibrary loan service. Several system suppliers allow online ordering which speeds up considerably one stage of the document delivery process. The library networks which allow transfer of cataloguing information, acquisitions, union catalogue holdings etc. lead to increased efficiency and standardization as well as a lessening of routine tasks.

Finally one could envisage a temporary lower utilization of libraries if patrons can sit at home and get answers to queries via their TV sets because the systems provide encylopaedias, community information, local history etc. as well as transactional videotex such as book reservation and fine paying.

We can arbitrarily divide information services into three groups—library-type information services; domestic information services and business information services.

Many of the new services available have been developed for the domestic market—to provide quick and convenient information and facilities for home use. These include videotex, teletext and the electronic directory. These services can also be used by the business community. In addition, however, a number of other specialized services such as electronic mail, local area networks, facsimile have also been developed with the business community in mind. Some of these services are in turn being adapted for domestic use.

Any or all of these services could be used in library information services, but in so far as it stands at this moment in time, very few of the systems or services are being used extensively, to my knowledge, in or by libraries and information centres in non-trial situations either to provide information to their patrons or as an additional information source for the librarian. Certainly, even in the trials it seems that little attempt was made to make the public aware of the library services and facilities per se via the videotex medium. True, the library might have acted as a provider and put information in, but it was not usually information about itself and what *it* could offer, but rather details about other community services and events. The question must be asked—are these systems here to stay? I think the answer has to be a resounding yes. People have a predilection for new fangled gadgets in the home, in the office and there's also the 'keeping up with Jones' phenomenon. At present existing systems may not contain exactly what is needed—but once users can have, at their finger-tips, via *one* terminal or work station all home management information—details of billings and payments, transactions etc.—as well as social, research and business information instantly accessible then the impact will be inexorable.

But it's not at present—the systems are still too new, too expensive, too duplicative of what's already there in a different form. And what will be needed is newer, more open attitudes and awareness to information technology in all aspects.

Conclusion

This paper has reviewed the recent trends and techniques in telecommunication transmission media and networks and has described some of the many new information services and systems which are evolving based on these new technologies.

Not all are available at present—transmission by optical fibres is still in its infancy; satellites are not yet being used for document delivery and integrated services data networks carrying voice, data, picture and text are still some way off.

The paper has also attempted to show where and in which areas these developments are currently being used. Figure 4 gives a summarizing overview. It should be quite clear that the concept of information technology has gone far beyond what we traditionally believe information to comprise. It can no longer be thought of in the narrow library sense and we must actively seize the opportunities provided by the new media to promote our libraries, our services and our image.

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Discussion

SESSION TWO (continued)

The following points were made during the discussion:

1. A number of lawyers, i.e. users, do not accept that a totally closed system such as LEXIS is suitable for a national legal information retrieval system. In Australia the LEXIS system had been rejected in favour of a more flexible hardware/software system which could be used to link together different information databases, from a variety of sources, running on compatible systems. It was agreed that a competitive environment was to be encouraged.
2. The equal provision of information to the legal institutions and the man-in-the-street or non-specialist was discussed. Although the existence of closed access systems encouraged privileged access to information, the specialised advantage of insurance companies for example, would disappear if the same information was available to everyone.
3. Negative results on searching a database were often significant—the absence of certain information was a definite and useful result.
4. The availability of legal information e.g. Statutes in Force on a database has not altered the demand for the same information in hard copy format. Indeed the availability of the text stimulates the sales of the printed version.
5. Any microcomputer can appear as a terminal on any other microcomputer. Despite the large number of different microcomputers, communication at this level is no problem so far as the electrical protocol is concerned. The problem is standardization of data handling. The whole area is the subject of extensive work by BSI OIS/- and by ISO in its work on the standardization of open systems interconnection.
6. No form of communication would completely disappear; there was always a need for different forms of communication to cope with different situations. It would be unfortunate if communication could only be achieved by remote control; by pressing a button. It was important to select those systems and developments which offered distinct advantages.
7. At the recent British National Bibliography Research Fund Seminar, it became clear that the cost of telecommunication in Europe is very high indeed compared with other developing countries, particularly the U.S. and, therefore European business is operating at a disadvantage. The new *Mercury* consortium of Barclays Merchant Bank, B.P. and Cable and Wireless was mentioned in connection with the possible liberalization of the British Telecom monopoly.

THE NEGLECTED RESOURCE:

NON-USAGE OF
LIBRARY-INFORMATION SERVICES
IN INDUSTRY AND COMMERCE

Margaret Slater

Considerable thought, time and funds have been invested in past attempts to identify the needs and wants of users of library-information systems. Comparatively little effort has been put into parallel study of non-users.

This study represents an attempt to redress this apparent imbalance. Experiences of library-information managers were sought, recorded and analysed. Coverage included causes and cures of suboptimal usage. This report is the first instalment of a planned series of projects and publications concerned with different aspects of the under-exploitation of industrial and commercial library-information services.

Ultimately the studies envisaged have practical aims: to cut down on wastage of an information facility provided by employers for employees; to help these employees work more easily, efficiently and with greater job satisfaction; by so doing, hopefully to increase work productivity.

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Serials control

D. F. Shaw

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Paper presented at the fifty-fourth Aslib Annual Conference, University of Oxford, 22–25 September 1981

Serials control is thought to be the most difficult of library housekeeping processes to automate. No automated serials control system has yet been demonstrated to be cost-effective. Reference is made to systems developed for large mainframes, e.g. OCLC, DOBIS, RLIN and UTLAS. Mini-computer based systems show promise of more efficient operation. Studies at Oxford have shown the feasibility of automated serials check-in being achieved faster than is possible manually. Further studies have demonstrated the constraints imposed for a comprehensive system to be cost-effective. Prediction of the arrival date for irregular serials is a major problem. The difficulties (and expense) of updating files in real-time represents another problem for which a tentative solution is proposed. The need to improve the user interface is emphasised and this is one of the most important matters for further study.

Introduction

WHEN I WAS invited to give the first of the four 'Talking Points' which constitute this morning's session it was indicated that the objective was to enable practitioners to inform delegates of developments in selected topics related to information in which we have recently been active. The Radcliffe Science Library, where my studies of serials control have been carried out, is the scientific department of the Bodleian Library.[1] Our collection of books and periodicals in Science and Technology amounts to about ¾million volumes and the current intake overwhelmingly comprises periodicals and monographic serials (over 80 per cent measured in terms of annual intake of items and over 90 per cent in terms of annual expenditure). Therefore, serials control is a very important matter for our housekeeping, and information on serials is widely sought by our readers. You will not be surprised to be told that we have been studying the feasibility of automation but, as in the majority of libraries, we have not yet decided to adopt a fully automated system for serials control. The main reason for this is that we are not yet persuaded we can afford it.

Cost-effectiveness

If an automated system is not cost-effective it is very difficult to justify its existence and even more difficult to find the funding to keep it going. Even in North America, where there is a great deal of automation in libraries and information networks, much

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of which has been financed by government agencies or charitable foundations, attention is now being sharply focussed on operating costs and budgets are having to be balanced. The most promising locations for serials automation systems are the large library cooperatives such as OCLC, BLCMP, RLG, UTLAS and WLN.[2] These all have major online computer systems with experienced specialist personnel and a guaranteed income (largely from monographic cataloguing services) to ensure the ongoing venture. It is therefore significant that, of these library groups, only OCLC offers an online serials control service, and it is very little used by the majority of the participants. I have spoken to some of the OCLC librarians and they say charges are too high for the benefits they would obtain if the serials package were to be adopted by them.

For a new system to be cost-effective in relation to an old system it must either do the job better for the same cost or at least do it as well more cheaply. I do not know of any automated serials control system which has been put to this test and has come through.

OSCAR

We have designed an online serials control system at the Radcliffe Science Library (called OSCAR) and have measured its performance and estimated its cost in relation to the manual operation. The results of this analysis have recently been published[3] and so this presentation is confined to a brief summary. The characteristics of the manual

TABLE 1. *Characteristics of RSL serials system*

Number of titles	20,000
Current titles (unclosed entries)	10,000
Parts received	47,000 per annum
Volumes bound	3,000 per annum
Accessions budget	£200,000 per annum
Estimated value of donated material	£200,000 per annum
Staff	9 (FTE)
Staff costs	£47,000 per annum

TABLE 2. *OSCAR options*

Option number	Process
1	Registration
2	Claiming
3	Subscriptions
4	Binding
5	New Titles
6	Cataloguing
7	Ordering
8	Circulation Control
9	Holdings Enquiries
10	File Maintenance

system on 1 October 1980 are summarised in Table 1. It is interesting that the staff costs to run the system amount to £1 per serial part processed. The activities included in this analysis are listed in Table 2 which shows the processes included in the automated-system design. The serials registration option has been written and tested. The performance indicates that the majority of serials parts can be registered [=checked-in] in about one minute on average. This compares with a time averaging two minutes per part for the manual system. The performance is thus similar to that reported by Nöthiger of ETH Zürich[4] and demonstrates that registration can be achieved more quickly.

Evaluation

Unfortunately the cost of the computer system is not covered by this time-saving at the registration stage. Further benefits may be expected however from the use of data, captured in the registration process, to carry out other processes in the serials housekeeping. The following such benefits have so far been identified and evaluated.

(i) Identifying claims *£2,000 p.a.*

There is potential to obtain and maintain more complete collections. This arises from the quick and efficient way in which overdue parts may be identified and claimed. During the past three years we have identified 500 missing, and previously unclaimed, parts out of a total intake of 140,000 parts. This represents 0.4 per cent of the total intake. The cost of purchasing replacement parts, together with the administrative and staff overheads totals £2,000 per annum.

(ii) Identifying volumes to be bound *£1,000 p.a.*

The preparation of serial parts for binding can be rendered more efficient for the following reasons: records are generated automatically without clerical effort, assistants may therefore be alerted as volumes become complete and orders can be issued automatically. The cost of labour and overheads for the binding preparation is £5,000 per annum and a saving of at least £1,000 per annum of this is feasible.

(iii) Sharing data elements *£1,000 p.a.*

The catalogue and serials register are generated automatically in the computer system from the same data elements. In the manual system these records are separately created by different members of staff. Over the last three years 1,200 new titles have been catalogued and entered in the current periodicals register. The catalogue costs £5,000 per annum to maintain and likewise the register costs £2,000 per annum. The overlap between these two activities is estimated to be £1,000 per annum which could be saved by automation.

(iv) Answering queries on holdings *£1,000 p.a.*

Readers' queries on holdings and missing issues can be answered more accurately and speedily. There should be some saving of staff effort on the activity of readers assistance estimated at £1,000 per annum.

Hence, adding the cost-saving of £2,000 per annum from the faster registration process we have identified a possible annual contribution of £7,000 towards the cost of the computer system. This is insufficient to cover computing costs which are in the range of £8,000–£20,000 (depending on the system) for annual maintenance, energy, communications, output hardcopy, microfiche and software. To this figure must be added at least £5,000 annually for hardware replacement. Clearly, additional benefits must derive from automation of serials if the system is to pay for itself. Full compensation for investment requires the development costs as well as those for implementation to be repaid eventually. We estimate a total investment of about 8 man-years for development and testing together with at least £7,000 for file creation. Fortunately, most of the development work has been relatively cheap as it was carried out by SRC-funded research students.

Unsolved problems—the future

We are continuing our studies knowing that staff costs will rise and expecting that computer costs will fall as time passes so that natural effluxion may one day solve the problem of cost-effectiveness. In the meantime there are interesting and indeed challenging problems to be solved. Let me conclude by referring to some of these:

(a) Data-storage

It was thought initially that data-storage costs would prohibit any attempt to design a cost-effective system. Fortunately, the outlook is more promising now that we have large capacity discs and well proved index-sequential file systems. Even so it is important to eliminate unnecessary data from the files to ensure that the minimum of information has to be searched or scanned when records are sought online.

(b) Real-time updating

In terms of urgency there is little justification for real-time updating of the file of issues held. When parts arrive they have often been subjected to delays at publishers, agents, docks, postal services, etc. amounting to several weeks, so that an additional day or two is not of crucial importance as far as service to readers goes.

For this reason it may be thought unnecessarily expensive to update files online during registration. Batch updating may be cheaper and offers the additional benefit of the facility to verify updating transactions with a second operator.

However, a batch updating system, with daily or even less frequent updating, creates problems for titles for which there is more than one holding. Unless files are updated online the registering librarian has no means of knowing whether identical issues have already been received that day and if they have, which holding they have been assigned to.

This problem can be overcome by manually presorting each day's arrivals, but such a solution is not likely to be justifiable unless a high value is placed on the facility to verify update data.

(c) Prediction of arrival dates

One of the fundamental errors in systems design originally was to assume that the arrival of serial parts was regular and predictable. It was desired to use a prediction to detect the non-arrival of an expected part and thereby intitiate a claim. In some systems a record is created for the next expected issue which is then matched by the arrival of that part, but the issue may never be published or an unpredictable issue may arrive. Therefore, we have chosen to decouple prediction from registration. Data on parts which have arrived are filed in sequence and this 'issues' file is scanned for gaps in issue numbers and for overdue items. However, even this fails in the case of very irregular serials.

(d) Improving the user interface

A typical sequence for registering a part is reproduced in the annexe to this paper. The dialogue works well for an inexperienced person, but becomes tedious with regular use. Command chaining, enabling some stages to be bypassed has proved valuable in some systems [e.g. DOBIS][5] but there is still considerable scope to improve the real-time dialogue.[6] This is one of the most important aspects of the system design and developments at the user interface of man-machine interaction with computers could well transform current systems in the near future.

(e) Effect of system size on cost effectiveness

The size of the serials collection has an effect on the system performance, but the extent of this is not yet known. A small online periodicals control system has recently been reported by Hackett which was developed at the Hull College of Higher Education.[7] This system handles about ⅙th of the parts and titles for which OSCAR has been designed. It is planned to effect a comparison between the two systems to see for example how the title file size influences the search key procedure. The large networks such as WLN, UTLAS and RLIN have not yet made sufficient progress in setting up online serials control for such a comparison to be made with a larger system, but it is expected that this should be possible one or two years hence.

ACKNOWLEDGEMENTS

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APPENDIX

RSL serials control: dialogue for typical registration of a serial part

```
Please login
  7


Enter option number or 'D' to display options:

  D
OPTION NO.                    PROCESS
          1                   Registration
          2                   Claiming
          3                   Subscriptions
          4                   Binding
          5                   New titles
          6                   Cataloguing
          7                   Ordering
          8                   Circulation Control
          9                   Holdings enquiries
         10                   File Maintenance
Enter Option No or 'Q' to logout

  1
Please input EITHER the search-key for the journal's title
              OR the journal's ISSN
  AMJOBO
1. DEFINITIVE TITLE
  'American journal of botany'
  SPONSORING BODY:
  'Botanical society of America inc.'
  ISSN: 0002-9122
The search-key you have input references the above title
You may EITHER input the number of the title you select
            OR re-input the search-key or ISSN

  1
  SELECTED TITLE:
  'American journal of botany'
  HOLDING (1)
       LIBRARY:       RSL               SOURCE: Purchase Blackwells
       STATUS:        Live and all      COPY: 1
                        available
       SHELFMARK:     Per. 19113 d. 210 RANGE: 1949-59
       SHELFMARK:     Bot. Per. 3       RANGE: 1960-
  HOLDING (2)
        LIBRARY:        Bot.              SOURCE: Exchange
        STATUS:         Live and all      COPY: 1
                          available
        SHELFMARK:      None              RANGE: 1914-
Please select one of the preceeding holdings by inputting its number
  1
  SELECTED HOLDING
        LIBRARY:        RSL               SOURCE: Purchase Blackwells
        STATUS:         Live and all      COPY: 1
                          available
        SHELFMARK:      PER. 19113 d. 210 RANGE: 1949-59
        SHELFMARK:      Bot. Per. 3       RANGE: 1960-
Please inspect the journal for damage or faults
Please EITHER input 'D' if it is imperfect
          OR input 'N' if it is all right
  N
  TITLE:
  'American journal of botany'
  LATEST ISSUE:        VOLUME:     68
                       PART:        3
                       SUB-PART:
                       EDITION:

Please examine the part which you are registering and choose one of the following
options by inputting its number:
  (1) The part is next in sequence after the one on the screen;
  (2) The part is later than the next in sequence;
  (3) The part is the same as or earlier than the one on the screen;
  (4) The part is a special issue, index or supplement.
  1
The issue description of the last part registered is:
     (1) VOLUME   68
     (2) PART      3
     (3) SUB-PART
     (4) EDITION
Please change this to the issue description of the part you wish to register by inputting
the line number followed by the new entry. Press the ESCAPE key after each line.
When all the details are correct input 'F'
  2 4
  F
Please input the number of issues which are contained in this part
  1
```

```
You have now set up the following details. Please check their accuracy.
     (1) VOLUME                          68
     (2) PART                             4
     (3) SUB-PART
     (4) EDITION
     (5) START ISSUE NUMBER               4
     (6) END ISSUE NUMBER                 4
     (7) DATE REGISTERED                 12 June 1981
     (8) PERSON REGISTERING              SYSTEMS ANALYST
Please make any necessary changes to these details by inputting the line number
followed by the new entry. Press the ESCAPE key after each line.
When all the details are correct input 'F'
  F
This transaction is now complete
```

Discussion

SESSION THREE

The following points were made during the discussion:

1. The practice of putting bar-codes on the covers of journals was discussed. If machine-readable codes were present on all journals, checking-in journal parts would be much simpler. However it was uncertain whether publishers would respond to these demands from librarians. Only 42 per cent of the journal intake in the Radcliffe Science Library included the ISSN on the journal cover.
2. The advantages and disadvantages of not having an online serials check-in procedure were discussed. The records were always one day out of date, however there was a security risk and records could be lost if online updating was available.
3. Although software packages to perform various serials control functions are available, the recurring problem is incompatibility, particularly between programming languages, e.g. COBOL and MICROCOBOL.
4. Problems in claiming out-of-print journal issues (often only noticed after a considerable period of non-receipt) could often be solved by such sources as Boston Spa and the British Library back-up service libraries, as well as by claiming from the publisher. A photocopy could often be obtained when the original was not available.
5. The BLLD was considering the automation of the check-in operation for their 55,000 currently received titles. However a number of subscription agents are now offering or are about to offer online check-in facilities for their clients. These systems seemed to be cost-effective for a small collection of documents and it was uncertain how effective they would be in manipulating the large files held by subscription agents and the BLLD.
6. There had not been an opportunity to examine the interface between the library service and specialized information units, e.g. drug information in health care. The Drug Information Service supplied a very specialized service for trained pharmacists which was not investigated in the main study which was concerned with library services.
7. It was suggested that the problem of 'wasted' research which has been financed by government was often one of lack of investment in the product *after* the research is completed, rather than one of badly defined projects.

Matching user needs in health care

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Paper presented at the fifty-fourth Aslib Annual Conference, University of Oxford, 22–25 September 1981

This paper outlines the pattern of library services available to staff in the National Health Service (N.H.S.) and gives a preliminary report of a study of library usage and of attitudes towards libraries among clinical and pre-clinical staff in the University of Oxford.

Libraries serving N.H.S. staff are numerous but small, most commonly being staffed by a single librarian, and receive little publicity. In spite of their small size a significant number of N.H.S. libraries have a 'special library' character. Teaching hospital libraries represent the intersection between the university and the N.H.S. library systems and are the largest of the libraries serving N.H.S. staff.

Data on usage and attitudes were collected by several different methods (questionnaires, interviews, observation, library statistics, feedback forms an analysis of 'failures' in finding documents) in the expectation that this would give a richer picture than would be provided by any one of the conventional survey techniques. The use of modelling methods for interpreting data is discussed.

A DESCRIPTION OF the library service within the N.H.S. is a useful introduction both to a group of little-known libraries, and to a research project aimed at matching library services to user needs.

Organization of the N.H.S.[1, 2]

The N.H.S. in England has a 3-tier administrative structure of Regions, Areas and Districts, established in 1972. Following a further reorganization in April 1982 the Area tier will disappear. There are 14 Regions in England. As an example, the Oxford Region comprises the four counties of Berkshire, Buckinghamshire, Northamptonshire and Oxfordshire. Following reorganization it will contain 8 districts. Scotland, Wales and Northern Ireland each have their own special administrative structure.

Factors influencing the development of library services

The character of library services within the health service, and their manner of development has been determined by several factors:

professional diversity of N.H.S. staff
geographical dispersion of staff
literature dispersion
lack of co-ordination

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Professional diversity

Many distinct professional groups contribute both to patient care and to the management and planning of the health service. These include:

doctors
nurses
medical scientists
managers and planners
occupational therapists
physiotherapists
speech therapists
architects
engineers
computer scientists

Doctors undoubtedly make the heaviest demands for specialized information services. Nurses are the most numerous group and libraries are recognised an essential element of nurse training schools.[3] The health service administers an annual budget of £7,000 million and this requires a high level of managerial skills and an equivalent level of library and information services, though these are not always provided. In addition to these three major groups there are a variety of minority professions, both those directly concerned with patient care, e.g. occupational therapists, and those providing technical support, e.g. engineers. Provision to this diversity of professional groups is made more difficult by a tradition of separate libraries for each of the main professional groups—doctors, nurses and managers. Very often minority groups are served by none of these.

Geographic dispersion

This is the most important factor influencing library provision. Medicine is a high-technology industry, but adequate provision of health care requires the dispersion of professional staff among a large number of relatively small units. Thus the 35,000[4] hospital doctors in the United Kingdom are distributed among 200 district hospitals, each of which houses all the major medical specialities, and a much larger number of smaller specialized hospitals (psychiatric, maternity, etc.). The 26,800[4] general practitioners are even more widely scattered. This dispersion of the medical profession can be contrasted with other professional groups in science and technology where the trend is towards concentration in large industrial or government research institutes, or in universities and polytechnics. Efficient library provision is much simplified by such concentration.

Literature dispersion

It is a general phenomenon that growth areas in science and technology are often at the borderline between two disciplines, but this is especially true of medicine. Practice and research in clinical medicine lean heavily on biochemistry, electronics and bioengineering; nursing draws extensively on the behavioral sciences. Adequate coverage of the literature is made more difficult by the multidisciplinary subject matter.

Lack of co-ordination

No national guidance on the co-ordination of library services is offered by the Department of Health and Social Security. As a result N.H.S. libraries have developed as isolated units with no organized co-ordination of their activity. More recently this deficiency has been corrected in some Regions by the development of Regional Library Systems (*see below*).

Libraries serving N.H.S. staff

The main groups of libraries serving N.H.S. staff are:

Postgraduate medical education centre libraries
Nurse training school libraries
Multidisciplinary education centre or hospital libraries
Regional and Area Health Authority Headquarters libraries/information rooms
University medical school/teaching hospital libraries

The first two types are far more numerous than the others and the most common pattern of provision is a postgraduate medical education centre library primarily concerned with the needs of hospital doctors and general practitioners, and a nursing school library primarily aimed at the nurses in training. The functions of both these types of library are combined in the multidisciplinary libraries which serve all N.H.S. staff in the hospital and in the surrounding community; such libraries are in a minority, though a significant one. Information needs of managers, planners and technical staff are mainly catered for by Regional or Area headquarters libraries.

Some idea of the size, extent and character of the N.H.S. library service is provided by a 1978 census[5] of librarians and libraries serving N.H.S. staff. The census identified 1045 libraries (defined as a 'collection of more than 200 books and five periodicals') and 755 librarians (153 in university or medical institute libraries). Of these librarians 375 were full-time, 169 were part-timers whose only responsibility was running a library, and 211 shared library duties with secretarial, administrative or other functions. Library qualifications were held by 326 (43 per cent) of those working in libraries (including 86 in university or institute libraries).

The census results, and in particular the low library staff: library ratio, illustrate the main characteristics of N.H.S. libraries: they are many in number and, with the exception of teaching hospital libraries, usually small in size.

Outside the teaching hospital, few libraries have more than three staff and most are likely to be run by a single librarian, full-time or part-time, who may or may not have some clerical assistance, and may have responsibility for one or more branch libraries. In spite of the small individual units, a number of N.H.S. libraries, especially those in postgraduate medical centres have a 'special library' function with an emphasis on information services and an increasing use of online services, most commonly MEDLINE.

Because of their small size N.H.S. libraries are little publicised and largely invisible to the outside world. The teaching hospital/medical school libraries are the better-known part of the network, and are the visible tip of the iceberg. They have a special significance both as the largest libraries serving N.H.S. staff, and also as the point of intersection between the N.H.S. and university library networks. All N.H.S. Regions have at least one teaching hospital library and the four London Regions and Trent have several.

Regional co-ordination of N.H.S. library services

Effective provision from a library service comprising many small units is possible only through the creation of a co-ordinated resource-sharing network under proper professional control.[6] In the absence of national guidance, individual Regions have taken the initiative in establishing *Regional* networks by appointing Regional Librarians.[7] The longest established regional systems are those in Wessex, which dates from 1967, Oxford and Northern Ireland. More recently Regional Librarians have been appointed in the North East, North West, South East and South West Thames Regions. In some of the other Regions a medical school librarian has some regional responsibilities, the extent of which varies from Region to Region. These will usually include at least the organization of a photocopy service from the teaching hospital library.

The primary functions of a Regional library system and a Regional Librarian are:

(i) to provide the library service with a voice at a senior level and to ensure that library and information needs are taken into account in policy decisions at both Regional and local levels
(ii) to encourage collaboration among all libraries in the Region, including the teaching hospital library
(iii) to establish photocopying, loan, online and other services which would benefit from organization on a region-wide basis
(iv) to ensure the appointment of properly qualified staff and to provide in-staff training and professional support

Research in medical library services

There has been substantial recent research interest in medical libraries with regard to the needs of users and the applications of telecommunications and computer technology. Recent studies include the Clinical Librarianship Project at Guy's Hospital in London in which two qualified librarians, with no special subject knowledge, were attached to a medical and a surgical team for a two year period. Their function was to identify and to attempt to satisfy clinicians' information needs in the working environment. The final report and conclusions of this project have not yet been published. Although there are strong arguments, especially in terms of cost, against the concept as a permanent part of medical librarianship, it is hoped that the project will provide insights into user needs arising from clinical practice and the means of satisfying them. There may also be implications for the training of library staff in an appreciation of the working practices of the medical profession to which they provide services. In contrast to libraries in other subject fields, which can expect to attract staff with special subject knowledge, medical libraries are unlikely to recruit staff with medical qualifications. Hence adequate training of staff is of special importance.

Heal[8], and Carmel and Childs[9], have both explored the information needs of general practitioners. Heal[8] surveyed needs and attitudes to libraries among GPs in the catchment area of two postgraduate centres in Kent. As an illustration of the special problems of user studies with medical staff, it should be noted that the coincidence of the survey with an influenza epidemic resulted in difficulties in collecting survey results. The South West Thames Region general practitioner project uses interviews with general practitioners to identify information needs and publicise services already available. This project has now been expanded to cover all community health workers.[10]

The British Library Research and Development Department (BLRDD), which is the main source of funding for research in librarianship and information science, has strongly encouraged, and in some cases initiated new research projects in the medical field. They commissioned a study on *The provision and use of medical literature*,[11] which included a questionnaire survey of a sample of 1000 hospital doctors and general practitioners in the U.K., smaller surveys of library use by dentists, nurses and physiotherapists, and a study of interlibrary loan and 'document availability' (is the book on the shelf when the user wants it?) performance in selected libraries. The intention of this project was a broad-ranging but inevitably superficial survey of the field in a limited timescale as a background for planning research and development activity. The authors of the study concluded that particular needs were an evaluation of existing current awareness bulletins, the development of services designed to overcome geographic isolation of primary health care workers including greater exploitation of MEDLINE and VIEWDATA (now VIDEOTEX) and improvements in review-type publications.

Ford's report[11] provided one of the main working papers for the Medical Information Review Panel established in 1978 by the BLRDD. The panel, which consisted of a group of doctors under the chairmanship of Sir Ronald Gibson, was asked *to identify problem areas in the provision of medical information, to determine their research order of priority, and to recommend how such problems might be tackled.*[12] The panel's final report[12] was published in April 1981 and contains 20 specific recommendations for action and research. Included in these recommendations is the proposal for the investigation of the opinions of users of postgraduate medical centre library services. A recommendation of particular significance to medical schools, and of long term significance to user attitudes to libraries is that: *medical students and doctors should be taught the principles of library and literature use by training and reinforcement, and should be able to adapt these in order to familiarize themselves with any library which they might need to use during their career.* (Recommendation for Action, RA5).

A study of pre-clinical and clinical users in Oxford

Responsibility for providing services to clinical and pre-clinical staff in Oxford is shared between the Radcliffe Science Library (R.S.L.), the Cairns Library and a number of departmental libraries. The Cairns role in providing for pre-clinical staff is small. The R.S.L. has already been described in an earlier paper in this conference.[13] It is part of the University's Bodleian Library and hence a major library of record; it serves all the sciences faculties including clinical medicine. However, the teaching hospital moved to a new site 4 miles from the R.S.L. (and from the other science departments) in 1979.

The Cairns Library is one of a significant minority of teaching hospital libraries which serve all groups of staff in the hospital and in the community: hospital doctors, medical students, general practitioners, nursing staff and students, administrators, paramedical staff, etc. It is also unusual in that it is an integral part of the Regional library network. The only other instance of a medical school library under the same administrative umbrella as a regional service is Queen's University, Belfast which provides a much more centralized regional service than Oxford with central purchasing and cataloguing for all libraries in Northern Ireland. It follows that the Cairns serves a much wider range of user needs than most other N.H.S. libraries.

The objective of the research project undertaken in Oxford was to explore patterns of information need and library use, and the attitudes of users to libraries. For particular user populations we were seeking answers (even if only partial ones) to questions such as: Why do you need information? How do you locate references to published documents? Which libraries do you use, how often and for how long? What are your reasons for using them? What do you consider is wrong with existing library and information services? We have already mentioned Ford's nation-wide study of medical users. This can be contrasted with the present project which is a much more intensive study of a very limited population in one location.

The experimental population

The experimental population comprised:

1. Clinical staff, *viz* members of the faculty including postgraduate students, and all hospital-based N.H.S. medical staff, with the exception of those in psychiatry. This population excludes medical students, general practitioners and non-medical staff.
2. Pre-clinical staff—arbitrarily defined as all staff engaged in teaching or research, including postgraduate students, in the University departments of Anatomy, Biochemistry, Pathology, Physiology and Pharmacology. The term 'pre-clinical' is used as a convenient, if not strictly accurate, shorthand for this group.

   The two populations comprised 685 clinical and 297 pre-clinical staff respectively.

Several complementary methods of data collection were used in a co-ordinated design intended to give a richer picture than could be obtained by any one method used alone. The methods were:

1. *Structured interviews* of ½–1½ hours duration were conducted by the researcher with random samples of 100 clinical and 100 pre-clinical staff. All but 2 of those approached agreed to be interviewed.
2. *Questionnaires* were sent to all other members of the two populations. Response rates were high: 78 per cent of recipients in both populations returned a completed questionnaire.
3. *Statistics of library use,* e.g. numbers of photocopy requests, interlibrary loans.
4. *Observation of user behaviour.* During selected periods the researcher observed user activities which are not reflected in library statistics, e.g. making an enquiry of library staff, consulting catalogues.
5. *Feedback forms distributed to library users.* During selected periods all users leaving the library were asked to complete a brief feedback form indicating what they had done in the library on that visit, and whether the visit had been successful.

6. *Document availability test.* Users requesting MEDLINE searches over a two month period were asked to specify which references on the output they would expect to look up at some time in the future. They were subsequently asked whether they had looked for them and if they had found them. The objective was to identify instances where the library system had failed to produce the required document.

These different types of data offer different perceptions of library use. For example, questionnaire and interview responses give the user's considered view of library services with the interview giving greater opportunity for the user to elaborate and explain his responses. In contrast, feedback forms completed when leaving the library give his *immediate* responses. Observation provides a researcher's view of user behaviour in a library. Library statistics describe the behaviour of the population as a whole as seen by the librarian. Data collected by observation, feedback forms and the document availability test identify some of the specific incidents which together contribute to a user's view of the library.

The data can also be differentiated in terms of the type of population which is being sampled. Questionnaires and interviews require a sample of users; observation and feedback forms require a time sample of library activity, or of events in the library; the document availability test uses a sample of references—or of a particular type of event; and library records are based on the events in the library, classified by type.

The large numbers of staff included in both interviews and questionnaire surveys were in order to provide sufficient data to identify variations in library use attributable to status, speciality, and degree of research or clinical orientation. Smaller samples could have been used if we had only wished to obtain statistically significant data for the complete populations.

Experimental results

This paper offers a preliminary report of the experiment with the intention of drawing attention to the existence and character of the project. It does not purport to give a full description of the results. A limited number of subsets of the data are given below to illustrate the different methods of data collection used and the character of data collected.

Interviews: Information needs

In interviews the question was asked: *What aspects of your work cause you to look for information?* Interviewees were presented with a list of possible categories and asked to rank them in order of importance. The results are summarized in Table 1 where the relative importance of each reason for information seeking is defined by arbitrary indices calculated from the ranks assigned (the higher the index, the more important the reason).

Both populations gave keeping up-to-date as the most important reason for seeking information, closely followed by writing papers, research, and problem solving. For the clinical population as a whole, clinical problems were a significant reason for seeking information ranking behind research but ahead of teaching. Predictably, those

TABLE 1. *Reasons for needing information*

	Clinical	*Pre-clinical*
Keeping up-to-date	2.2	2.6
Writing papers and books; preparing for lectures and scientific meetings	2.1	1.8
Undertaking and supervising research	2.0	2.2
Solving specific clinical problems	1.6	—
Solving specific problems	—	2.1
Teaching (formal and informal)	1.2	1.1
General interest	0.8	0.9
Further education	0.7	0.3
Looking for job advertisements	0.4	0.3

who were more strongly oriented to clinical practice than to research, were more likely to mention clinical problems. Among pre-clinical staff the functions of particular groups were reflected in their responses: the highest ranking was given to teaching by departmental demonstrators; to writing papers by university lecturers; and to keeping up-to-date by research workers. This question was asked only in interviews; it was felt that meaningful answers could not be obtained in a questionnaire.

Questionnaire: Libraries used
Both populations apparently require (or choose to use) a wide range of libraries to satisfy their needs. The 457 clinical questionnaire respondents named 84 different libraries. The 86 per cent of the sample using the Cairns usually visited it once a week and stayed for less than an hour; the 69 per cent who used the R.S.L. usually visited it less than once a month but stayed more than an hour. Departmental libraries provided the third tier of library provision with visits frequent but very brief. Royal College of Institute Libraries in London were also used by 16 per cent of the population with the R.S.M. the most frequented (10 per cent). The smaller pre-clinical population (151 respondents) still managed to name 27 different libraries though the bulk of library activity was concentrated in the R.S.L. and their own departmental library.

Questionnaire—Reasons for using a library
Table 2 summarizes the questionnaire replies of the clinical population to the request: *Indicate the relative importance to you of the following specific reasons for using a library, and the frequency with which you use each facility.*

The rankings given in Table 2 were calculated by assigning numerical values 3,2 and 1 respectively to the replies important, useful, of no interest. Frequency of use replies were analysed in the same manner. Alternative methods of weighting produced only minor changes in rankings.

In relation to questionnaire design, it should be noted that the categories *of no interest* and *rarely/never* were probably too extremely worded. This may have dissuaded respondents from using them; a less extreme category, e.g. *of limited use*, might have achieved greater discrimination amongst the different reasons for using a library.

TABLE 2. *Reasons for using a library in ranked order of importance*

per cent of clinical population replying:						*per cent of clinical population replying:*		
Frequently	Sometimes	Rarely/Never	Ranking		Ranking	Important	Useful	Of no interest
68	31	1	1	For looking at earlier issues of journals in the library	1	83	17	0
67	29	5	2	For looking at the latest issue of a journal in the library	2	71	28	1
38	52	9	3	For consulting books in the library	3	54	45	2
39	44	17	4	For obtaining a photocopy of a journal article	4	56	39	5
29	54	17	5	For carrying out your own literature searches	5	53	41	6
16	47	37	7/8	For obtaining loans or photocopies from other libraries	6	49	42	9
18	53	28	6	For borrowing a book from the library	7	34	56	9
8	46	46	11	For a computer search	8	32	46	22
18	42	41	7/8	For borrowing a journal from the library	9	26	56	18
16	40	44	9	For a quiet place to work	10/11/12	30	37	33
10	46	44	10	For obtaining photocopies of part of a book	10/11/12	23	56	21
5	47	47	12	For advice and guidance from the library staff (excluding help with computer searches)	10/11/12	19	60	21

The replies summarized in Table 2 emphasize the primary importance to the clinical population of adequate access to current and back issues of journals. Book stock, photocopies of journal articles, literature searching and interlibrary loans form a second group of facilities ranked as being of almost equal importance though less so than journals. These data also stress that users require a multifunctional library. Though *a quiet place to work* had a low *relative* ranking it was still considered an important function of a library by 30 per cent of the population. Similarly, *computer searches* even though very infrequently used, were viewed as important by 32 per cent of respondents. *Computer searches* were the only facility to show a marked difference between importance (ranked 8th) and frequency of use (11th). A chastening and worrying statistic for library staff is that 47 per cent of clinical staff and 59 per cent of pre-clinical staff rarely or never sought advice or guidance from them. Was this because they didn't need it, didn't know they needed it, or didn't expect to get it?

The responses of the pre-clinical population were similar to those of the clinical except that *consulting books* was rated as more important, and *carrying out literature searches* and *computer searches* as less important than for the clinicians. The responses given to this structured question were fully consistent with those of an open-ended question also included in the questionnaire: *What do you consider are the most important facilities in terms of stock or services which a library should provide?*

Questionnaire: Inadequacies of the library services

In response to the question *In what ways are the library facilities which are available to you inadequate?* critical comments were made by 61 per cent of clinical and 67 per cent of pre-clinical staff. The subject of the criticisms varied very widely but comments on the Cairns centred on its poor journal and book stock, and those on the R.S.L. on its photocopying service and closed stack. All libraries were criticised for journal binding practice which resulted in journals being away from the libraries at the time when interest in their content was highest. Criticisms of loan services were relatively infrequent and readers appear equally divided as to whether libraries should expand their lending facilities, or reduce them to ensure that items were more likely to be on the shelves when needed.

Questionnaire: Sources of references

How do people learn of the existence of references of potential interest? The percentage of the two populations who considered each of the following to be an *important* source of reference are given in Table 3.

TABLE 3. *Sources of references*

	Clinical (%)	*Pre-clinical* (%)
Other journal articles	82	93
Index Medicus	55	22
Computer searches	37	13
Current Contents	27	39

The pre-clinical staff mentioned 11 other indexes or abstracts, including specialized publications such as *Athropod-borne virus information exchange.* However there is no one pre-eminent service with a status comparable to *Index Medicus* for the pre-clinical population and as a result they were less enthusiastic about secondary sources (other than *Current Contents*).

Document retrieval failures

This experiment identified 425 possibly interesting references in MEDLINE outputs for 39 clinical and 2 pre-clinical staff. The fate of these references was:

Looked for and found—in an Oxford library	44%
—from interlibrary loan	6%
Looked for and not found	6%
Not looked for after 3 months	44%
	100% (=425)

Of the 25 (6 per cent) 'failures': 6 were items held by the library but not on the shelves when the reader looked, and he did not try again; 18 were items found not to be in the library, and the reader did not request an interlibrary loan; 1 was an interlibrary loan which did not arrive. Ostensibly these figures suggest a high performance by the library system with 88 per cent of 'looked for' items being found. This may be partly illusory as discussions with users suggested that an uncertain proportion of the 'not looked for' category reflected the user's expectation that an item would not be in the library and hence was not worth looking for. Other evidence supported the contention that users of libraries (and probably of other services) tend to ask only for what they expect the system to be able to provide; low expectations therefore flatter system performance.

Clinical and research orientation

The population characteristic most likely to influence library usage was the degree of clinical or research orientation among the clinical population, as defined by the question: *what percentage of your time do you spend on: clinical practice/teaching/research/administration?* A comparison of research-orientated staff with those with a heavier clinical commitment showed that the former appeared more interested in the stock of the library, particularly journals, less interested in borrowing services, more likely to use *Current Contents*, and less likely to use *Index Medicus*. In many respects their library usage was close to that of their pre-clinical colleagues.

Interpretation of data—modelling methods

At its outset the project was conceived as a user survey which could provide a rich picture of patterns of library use and user attitude. However, at an early stage it was decided that systems thinking and modelling methods might be of assistance in understanding the library system under study. Such methods could also simplify the interpretation of the large amounts of data collected in the project in a coherent and digestible manner, and facilitate their use for management decision-making. Initially, a network model was favoured in which the operation of the library service was viewed in terms of moving readers, librarians, library stock, copies of library stock, or records about library stock around the network. Consideration was also given to RAND-style systems analysis[14], and to simulation and prediction models such as the Systems Dynamics model[15] of the impact of online bibliographic services which is being developed at University College, London. However the central concern of the present study was with user/library interaction rather than with the efficiency of library functions. For this purpose quantitative methods appeared of limited value and they were eventually discarded in favour of the qualitative methodology for conceptual modelling developed by Checkland[16] at Lancaster University. This method does not result in a mathematical model but provides a structure for thinking about the system. Checkland's approach concerns 'Human Activity Systems' which include elements of human perception and value.

The methodology is iterative, comprising an analysis, a conceptual modelling and a comparison phase. Analysis enables selection of a relevant system—in this case one that illuminates the user/library interaction. Root definitions of that system are then derived. These are short statements defining the essential characteristics of the system. As guidelines to formulating root definitions, Checkland suggests that the following questions should always be asked (even if they are not always answerable): who are the owners and the customers of the system? what is its environment? what transformations take place in the system and who is responsible for them? what is the *Weltanschauung* implicit in the researcher's approach to the system and his root definition? The next stage is the creation of conceptual models which describe what the system must do in order to fulfil its root definition. These conceptual models are then compared with what actually happens or exists in the real world. Differences between the real world and the conceptual model are then used to learn about the system and to contribute to a debate on possible changes. The application of the techniques is still in progress, but their adoption represented a major shift in emphasis in the project away from modelling the use of library functions toward the use of systems ideas to identify the sort of model of its *users* which the library must maintain in order to provide them with a service.

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CODATA: meeting the needs of the scientific community

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Paper presented at the fifty-fourth Aslib Annual Conference, University of Oxford, 22-25 September, 1981

BEFORE CODATA WAS established the collection, compilation, evaluation and publication of scientific numeric data was largely uncoordinated. These activities were in the hands of individuals whose interests were limited to rather narrow fields, public organisations such as atomic energy authorities, scientific Unions and societies, industrial associations and commercial firms. In the early 1960's the U.S.A. and the U.S.S.R. established national programs aimed at providing a systematic approach to the compilation of critically evaluated data. However the magnitude of the task is so great that fully international cooperation is necessary and, in 1966, CODATA (Committee on Data for Science and Technology) was established as a committee of ICSU (International Council of Scientific Unions).

The aims of CODATA are summarised in its Constitution: 'CODATA, working on an interdisciplinary basis, shall seek to improve the quality, reliability and accessibility of data of importance to science and technology, including not only quantitative information on the properties and behaviour of matter, but also other experimental and observational data.' This statement reflects the fact that, whereas during its first ten years CODATA was primarily concerned with the laboratory data of physics and chemistry, it has now widened its scope to cover the biological sciences and geosciences.

In describing the formal structure of CODATA it should be noted that it is not a committee in the usual sense of the word but would be better described as an interdisciplinary scientific Union. There are three types of members: national, Union and co-opted. At present sixteen countries are members, each by adherence through its national academy of science. Fifteen of the constitutent Unions of ICSU are members and a list of these illustrates the wide scope of CODATA's subject fields. They are:

Astronomy
Geodesy and Geophysics
Geological Sciences
Geography

Crystallography
Pure and Applied Chemistry

Biochemistry

Biological Sciences
Immunological Societies
Nutritional Sciences
Pharmacology
Physiology

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Pure and Applied Physics
Theoretical and Applied Mechanics
Pure and Applied Biophysics

Finally two organisations are co-opted members viz. the Federation of Astronomical and Geophysical Services, the ICSU Panel on World Data Centres. The business of CODATA is coordinated by a Secretariat located at the ICSU headquarters in Paris.

The scientific objectives of CODATA are, in the main, achieved through the work of its Task Groups. At present the twelve Task Groups are concerned with:

Accessibility and Dissemination of Data
Computerised Data Handling
Fundamental Constants
Thermophysical Properties
Key Values for Thermodynamics
Internationalisation and Standardisation of Thermodynamic Tables
Chemical Kinetics
Standardisation of Databases for NMR and Photoelectron Spectroscopy
Property Data on High-Pressure Phases
Data for the Chemical Industry
Methodology of Handling Space-and Time-Dependent Data
Biothermodynamic Data

In addition to these Task Groups there are three committees which monitor the need for special projects and/or new Task Groups in the areas of the biosciences, geosciences and industry. A few representative activities of CODATA will now be discussed.

A prerequisite for the critical evaluation of published numeric data is that the data are adequately reported. Thus there must be information which describes the experimental procedures, the reduction of experimental data, the assessment of systematic and random errors etc. In 1973 CODATA published a 'Guide for the Presentation in the Primary Literature of Numerical Data Derived from Experiments' in which these principles were enunciated. This document stimulated the later publication of similar Guides for specialised subjects such as chemical kinetic data, biochemical equilibrium data, biological data, physical property correlations and estimation procedures, geoscience data.

Of central importance to many scientific disciplines are the fundamental physical constants. Thus, for example, the speed of light in a vacuum is c 299792458 (1.2) m s^{-1} with an uncertainty of 0.004 parts per million. In 1973 the relevant CODATA Task Group published a set of 'Recommended Consistent Values of the Fundamental Physical Constants'. These 47 constants are under constant review and a revised set will be published at the end of this year.

The efficiency of chemical industrial processes is very dependent on the thermodynamics of the chemical reactions involved. The Task Group on Key Values for Thermodynamics published, in 1978, a set of recommended key values for 125 chemical species. For each species is reported the standard enthalpy of formation, the standard entropy and the standard enthalpy increment between 0 and 298.15 deg.K. A new set of values will be published shortly taking account of any new values of the fundamental constants.

As indicated earlier, one of the aims of CODATA is to improve the accessibility of data. The production of directories of data sources is, therefore, an important activity. In 1969 CODATA published an 'International Compendium of Numerical Data Projects' which was concerned with major data projects and publications in physics and chemistry. During the last five years a systematic program has been initiated to update and extend that early effort. The new publication is the 'CODATA Directory of Data Sources for Science and Technology'. To date six chapters have been published covering the fields of crystallography, hydrology, astronomy, zoology, seismology and chemical kinetics. A similar project has recently been concluded to produce an Inventory for Unesco with special emphasis on six areas viz. hydrological sciences and water resources, renewable energy sources, soil science, pesticides, fertilisers and nutrition.

Another aspect of CODATA's work is the organisation of training courses. These are concerned with, for example, the statistical treatment of numeric data, the computerised management of data and the problems of accessibility and dissemination of data. Four courses have been held in Yugoslavia, Poland, Japan, France and the fifth will be conducted in Brazil later this year.

Every two years CODATA organises an international conference on a variety of data topics. These have become a significant component of the data scene, with over 300 participants at last year's conference. The proceedings of these conferences are now published by Pergamon Press, as are the other CODATA reports which appear under the title of the CODATA Bulletin. Further information may be obtained by writing to the Executive Secretary, CODATA, 51 Boulevard de Montmorency, 75016 Paris, France.

To charge or not to charge—who pays for the information

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Paper presented at the fifty-fourth Aslib Annual Conference, University of Oxford, 22-25 September 1981

Introduction

IN ANY SOCIETY the costs of providing goods and services inevitably will have to be borne by that society. Information is no exception, in that there is a direct cost or opportunity cost of gathering and communicating data. Ultimately it is we, the general public, who have to bear this cost either in the form of taxation to support information and research activities by the authorities and its beneficiaries in receipt of grants or subsidies, or in the price we pay directly for our goods and services. The true cost of information is frequently lost or distorted through the existence of a system in which public and private sectors do not always complement each other and in fact may be in open competition.

The size of the charge

As a frame of reference for some possibly controversial views I should like to pose a few basic questions:

— What are we talking about when we say 'information'?
— What is the magnitude of its cost?
— How is it structured in our society?
— Is this an effective structure?
— Can we derive more value from information?
— Can we reduce its costs?
— Is there a case for re-allocation of costs?

I put these questions to my senior research staff at the FT Business Information Service especially in relation to public sector activities. After fairly extensive research they concluded that it was difficult to define information precisely within a societal context and impossible to obtain or even estimate the global cost figures. The main reasons for this were:

(a) the difficulty of defining precisely what constitutes information gathering and processing
(b) the information functions in the public sector (and in industry) are frequently decentralized and carried out under the label of administration or some other

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vague designation. Rarely does information gathering and processing appear as a specific budgetary item

(c) estimates based upon occupation are equally elusive, since many information and research staff are classed within the clerical group.

Having said this there are many examples one can give which suggest the size and scope of the information activity:

1. In 1978 there were 5.3 million public servants, that is to say in central Government and local authorities employment, a section of whom would be directly concerned with the information activity. The number employed in Whitehall in 1978 was 700,000. A Government White Paper this year revealed that in 1981–1982 the Civil Service payroll would be around £5,000 million, plus services of £1,500 million, giving a total of £6,500 million.
2. The Rayner White Paper cites the Government statistical services as costing £100 million and employing 9,000 staff.
3. In 1979 the Companies Registration Offices in London and Cardiff cost £12 million to operate. This was apparently exceeded by income, although it is not made clear whether the total costs of running the service were incorporated in the profit calculation, or whether these costs were written off centrally.
4. The FT Group of Companies, dealing exclusively with information for the businessman, employs some 1,800 staff and in 1980 more or less broke-even on trading revenue of £49 million.
5. In that same year BBC Television had net revenues of around £330 million, mainly from licensing fees. It is difficult to separate entertainment from serious information-based programmes dealing with news, current affairs and education, etc. but if we assume the latter constitutes 30% of the total, then this suggests a budget of around £100 million.
6. In the USA policing the disclosure of corporate information is one of the key functions of the Securities and Exchange Commission (SEC). With 2,000-odd employees to ensure that companies produce the vast amounts of statutory financial data at an estimated cost of over £500 million, it is little wonder that the SEC is falling under increasing scrutiny and criticism.

These vast sums of money represent only the tip of the information 'iceberg', the total size of which I should now like to make the subject of some speculation. My starting base is World Gross Domestic Product (GDP) for 1980, together with some estimates of its component parts, namely energy and agriculture, which are claimed to account for around 8% and 15% of GDP respectively. I believe that in developed economies the total activity in the information sector is likely to exceed that in the energy sector. We can take 10% of GDP as a crude but conservative yardstick of information gathering, processing and management. Translated in terms of some specific countries we have:

Country	GDP (Billions) Local Currency	Information Activity (Converted to £ Billions)
UK	223	22
USA	2,577	111
Japan	228,300	43

Germany	1,499	35
France	2,755	28
Netherlands	321	7

So in these countries alone we are talking in terms of a total industry worth some £246,000,000,000! That is an indicator of what is being charged somewhere along the line.

The hidden value

May I refer back to the title of this paper which was proposed by Aslib. It hints at the controversy surrounding the cost of information, how it should be charged and who should pay. There are those who would express deep indignation over the prices that are charged for some kinds of information. Who can blame them when, for example, they are accustomed to having access to television for almost 15 hours a day and to radio programmes 24 hours a day for around £150 per annum—or 41 pence per day per family. This is inclusive of licence fees, electricity and depreciation on the equipment. Furthermore, you can buy the FT for a year for around £90 and you will receive around about 12,000 pages packed with information and balanced comment. Each page represents some 15 minutes reading for around three quarters of one pence! How many similar examples of value for money can we find in other industries today?

But the FT is the same organization that has the affrontery to charge almost £30 an hour for research time in its Business Information Service; £160 a year for 12 editions of a newsletter; £220 a year for a printed index to its pink newspaper which itself only costs £90 a year! One can sympathize with those who protest—almost! But here I must refer back to the earlier remarks about the true cost and real value of information.

In the context of value, costs and effectiveness, there are some interesting examples to consider from the public and private sectors. A provocative article by Ian Davidson in the FT last year suggested that if we were able to reduce the number of public servants (5.3 million) in the UK (population 55 million) to the same number (3.0 million) as in France (population 53 million), a saving of around £9 billion per annum could be realized. Compare this with something that could contribute towards the downfall of a Government—that is the 1980–81 Public Sector Borrowing Requirement of £12.3 billion.

Then there are the countless situations in which the costs, and probably the value, of information is hidden through subsidies in one form or another. The true cost of producing one copy of the FT is around 63 pence; readers actually pay 30 pence, of which we in fact receive about half after allowing the margins for the distributive trades, with the balance of our revenue coming from advertising. To recover the true cost of providing this information, unsubsidized by advertising, and to make a small profit would require charging a cover price of just over £1.20 per copy. Even our £30 an hour Business Information Service is heavily subsidized, since it has free access to the FT's vast store of data in the library. If we had to set up and pay for our own databank facilities, it is likely that our charges would have to be £60–70 per hour. Our newsletters and Index to the FT are not subsidized, incidentally. Aslib too has an example of a service subsidized by Government grants initially, in its Online Information Centre.

Insufficient revenue—insufficient innovation

These examples lead me to two further facets of our problem. First is that much information is for the purpose and benefit of very small user groups. This information may be costly to gather and manage, but may be essential for the user group in question and of great benefit to society as a whole. Secondly, it raises the question of whether there is sufficient incentive to accelerate the processes of creating new information products from original research. The costs of doing this for highly specialized applications militate against such innovation, since the returns on investment may be small or non-existent. The familiar reasons were again highlighted by Rory Johnston in a July edition of *Computer Weekly*:

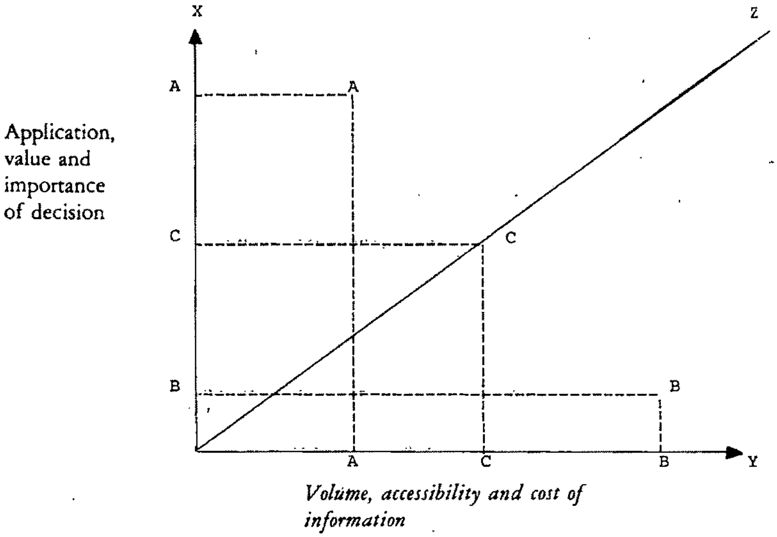
> 'Businesses in the UK and elsewhere in Europe are still seriously ignorant of the value of information and the need to pay for it. That is the main conclusion of a report from the National Computing Centre, which reveals that use of online databanks in the US went up by 1,500% over the last five years, while in Europe the corresponding rise was only about 200% . . . Businesses in Western Europe were not used to having to pay for information, because of the tradition of free public libraries.'

It is possible that these circumstances in combination have resulted in the major information investment being concentrated either in the public sector, or only in the large profitable companies within the private sector. The NCC points out that many large corporations are now moving into the information supply industry. Firms such as Thomson and Lonrho are expected to follow their acquisitions in publishing with attempts to take control of other types of information suppliers, following the lead of Pergamon Press in taking over Infoline. Despite developments of this kind, one suspects that the level of investment from the private sector in the research and creative aspects of information, has not paralleled the investment in hardware and software technology. We see this quite clearly in the FT which, as a major information generator, frequently has approaches from computer bureaux and networking organizations seeking reputable information products to put up on their systems.

One thing is certain—until the real value of information is recognized and accepted there will be little incentive for other than cash-rich organizations in the private sector to invest seriously in the creative end of the information business. The costs are too high, the pay-back period too great, and the risks too formidable. It will be left to these large organizations—many already quasi-monopolies in their particular field—to ensure that future progress in this industry tries to keep pace with demand. Undoubtedly, organizations such as McGraw Hill, Reuters, Dun and Bradstreet, Dow Jones and Pergamon will attempt to perform this role conscientiously. But one suspects they will be seeking the major projects to support—large databases and information distribution systems—and the more specialized information activities with selective and limited but important applications could become neglected in consequence.

Avoiding the saturation syndrome

There is another increasingly important feature of the information business, strengthening the arguments in favour of discrimination and selectivity of data. I recall a paper at the Aslib Conference two years ago supporting information by exception, and hence management by exception systems. The speaker observed that a considerable amount of time and money is devoted to the study of information merely to be satisfied of its irrelevance. In other words it was not necessary to read it at all. The message from this is effectively and simply illustrated by a modification of the old Boston Consulting Group model in Fig 1.


X
Z
A
A
Application, value and importance of decision
C
C
B
B
A
C
B
Y
Volume, accessibility and cost of information

Situation A: The information factors on the Y axis are inadequate in terms of the importance of the decision on the X axis.

Situation B: The importance and value of the decision on the X axis do not merit the volume and cost of the information supporting it on the Y axis.

Situation C: The Z plane represents the ideal points of convergence of the two factors, where the information gathered and its cost match the importance of the decision to be made.

FIG. 1. *The value of information*

The concept of information by exception is of increasing importance to FT Business Information Limited. Research and consultancy assignments concerned with monitoring and analysing key areas of information which we jointly identify with clients, represent an area of growing involvement. Some clients find it cost-effective to pay substantial fees to avoid being deluged with information; or more precisely, to have relevant information systematically extracted from a mass of data.

The 'Public vs. Private' debate

As well as trying to focus on the immense size of the information industry in its widest sense, I have used a series of examples to support the suggestion that the quality and management of information within our society could be much improved.

It is my contention that the information available from both public and private sectors can be neither efficient nor cost effective until the real costs and value of information are identified.

The debate about the balance in the provision of information between public and private sectors will continue, with all the implications this has for direct or indirect charging for the services in question. For the public sector it must be said that Government requires objective, reliable and timely information to support its decisions and policy-making processes. Over recent years the information requirements of Government have expanded considerably to fulfil these functions and also to meet the demands of the public. However, data does not come free of charge and it is encumbent upon Government to ensure that the burden it imposes upon the taxpayer and form filler is no more than is essential for the discharge of its functions.

In particular there should be a review of all information activities conducted for purposes other than meeting the needs of the authorities. There is no more reason for the Government to act as a universal provider in the information field than in any other sector. Information should not be collected primarily for publication, but because it is essential for the effective functioning of Government. Where information thus collected is of value to commerce and industry then a commercial price should be charged to reflect the true cost of gathering that information. In this way the costs will be met more by the consumers of that information or its end-product and less by the taxpayer as a whole.

For their part information consumers would have to come to terms with these higher costs, which of course could result in higher prices of goods and services. On the other hand businesses could maintain prices and accept much lower margins if they were able to sustain their after tax profits through a reduction in the rate of Corporation Tax. With a more attractive price structure for information suppliers and the greater prospects of earning profits from new information products, we could reasonably expect to see more investment in this area. Competition would stimulate innovation in an environment where the attendant risks are better balanced by the potential for reward than at present.

Conclusion

In conclusion, I would submit that to charge for information one way or another is unavoidable. I would urge a reduced involvement by government in information activities peripheral to supporting the main functions of government. Any information available from the public sector should be charged at a realistic rate which, by conditioning the expectations of the consumer, would make this industry even more attractive to private enterprise. By the stimulation of innovation through competitive market forces, the quality and relevance of information products would greatly increase. I would particularly welcome the opportunities this could present for the smaller information specialist, and the smaller information consumer.

But in the final analysis who pays?
—We do!

Discussion

SESSION THREE

The following points were made during the discussion:

WATSON

1. Data flagging schemes used by INIS Atomindex and by Physical Review were mentioned. In the former scheme flagging was done at the abstract selection stage, in the latter authors assigned flags from a list supplied.
2. As retrieving information online is expensive consideration should always be given to the urgency with which the data is required. Offline printing would give a delay of approx. 3 days.
3. It is still necessary to keep open all the options i.e. online vs. offline vs. printed format.

AYLWARD

1. The speaker's postulation was for a change in the balance between 'freely' available information (provided by government-funded research, local government etc.) and information which could be collected by private industry and made available at commercial rates, e.g. population studies are of deep significance to the private sector and could be made and paid for by the private sector.
2. If potential commercial viability had been a yardstick of the NRDC then some projects would never have been funded, although there would be some research that could not be immediately viable commercially. Too many decisions are taken and controlled centrally (i.e. by government bodies) there is a strong case for the return of a large number of these centralized activities to the private sector.
3. If government were to hand over large areas of information collection and dissemination the corporation tax could be reduced, leaving more money for investment leading to higher returns, thus attracting more equity into the company and encouraging growth.

Photocopying rights and wrongs: a librarian's view

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Paper presented at the fifty-fourth Aslib Annual Conference, University of Oxford, 22–25 September 1981

Introduction

CONTROVERSY WAS AROUSED by the Whitford Report of 1977.[1] Library professional bodies and others argued strongly against the Report and recommended alternative approaches to cover multiple copying.[2] In respect of photocopying, the Whitford Report recommended 'blanket licensing to cater for all user requirements for facsimile copies' with payment of royalties to collecting societies for distribution to copyright owners. The licensing scheme envisaged would remove the right of an individual to the 'fair dealing' single copies which are allowed without royalties by the 1956 Copyright Act, though private researchers or students would be permitted to make their own manuscript copies. Owners of coin-operated machines would require a special licence and responsibility for infringement would be transferred from the individual user to the machine owner.

Retention of the single-copy allowance, and the continuance of individual responsibility for infringement, are considered essential by librarians. Increased photocopying cost could be disastrous for research of all kinds, could damage the equality of opportunity concept, and could well increase the currently persistent nuisance of mutilation or theft of library materials to a major menace.

The publishers have nevertheless pressed forward with producing their own version of a licensing scheme, in advance of any legislative support, and have proposed its application to all facsimile copying whether single or multiple. News of their intentions first appeared in the press in April last year.[3]

In the autumn of 1980, a letter was received by the various library professional bodies, signed by Lord Wolfenden as Chairman of the Committee of U.K. Copyright Owners on Licensing of Photocopying. Two forms of draft licence for schools were enclosed as examples, and an opportunity to discuss their adaptation to libraries was requested.

From the way in which reference was made to the Whitford Report, the Wolfenden Committee apparently regarded it as draft legislation. There was however no reason to believe that the Whitford recommendations would have to be implemented. Nor has the Wolfenden Committee any authority or powers beyond representation of a group composed mostly of publishers. However, that Committee's powers of representation were obviously quite full in respect of photocopying matters. By comparison, our multiplicity of professional bodies, each with its own copyright working group, seemed somewhat slow and disorganized. True, the Joint Consultative Committee (of Aslib, Institute of Information Scientists, Library Association, Society of Archivists, and SCONUL) set up its Working Party on Copyright in early October, but it decided only to meet again when an expected Green Paper on copyright law reform came to hand. In any event, the JCC/WPC reports back to the several other committees, and so on.

It was learned with some concern that local education authorities (LEA's) had already been approached with draft licences for discussion. In the special case of COSLA, the Convention of Scottish Local Authorities, educational licence discussions with the collaboration of the Council for Educational Technology (CET) had been in progress since 1978 without conclusion. Despite this, the Wolfenden Committee was seeking to extend the pilot scheme which it was hoped COSLA would accept to other categories. A link was therefore established with all U.K. local authority associations. Under considerable pressure from the Wolfenden Committee because of two infringement damages cases involving music, the LEA's had not realized that their own worries about the licensing proposals might be shared by other groups.

The concern arose from the possible outcome, should agreement be reached with the LEA's at that time. As the Green Paper was imminent, any contractual arrangements in advance of such reform were seen as endangering democracy by pre-empting discussion. Contrary to the assumption apparently made by the rights owners, the needs of schools and of libraries in general are closely related, and call for co-operation with LEA's in future approaches to copyright.

In December, COSLA studied the final reports of their working group and shelved the pilot licensing proposals after all. Discussions then started between the Wolfenden Committee and the joint working party on copyright of the Association of County Councils (ACC) and the Association of Metropolitan Authorities (AMA). The fact that the ACC/AMA group was acting largely on behalf of LEA's did not, however, appear to relieve the pressure that individual local authorities felt themselves to be under.[4] However, no local authority has signed an agreement as yet.

Library professional bodies deferred meeting the Wolfenden Committee until the Green Paper could be at least studied. An effort was made to increase understanding of a librarian's viewpoint among the rights owners.[5] The ACC/AMA group has sought the agreement of the Wolfenden Committee on a schools code of practice, wherein there would be some educational concessions without royalties. The Committee has continued to press for licensing and there has been little progress.

Overseas developments

Meanwhile, the Australians made some amendments to their 1968 Copyright Act, whereby educational institutions are given a statutory licence to make multiple copies within certain limits, provided records are kept. The rights owners can then have access to the records and claim royalties accordingly. The Australian amendments follow the Franki Report[6] fairly closely. Looking towards the U.S.A. as the largest English-speaking nation, it is noted that the Copyright Clearance Center is reported to be in economic difficulties.[7] The CCC was set up by the publishers when the 1976 Copyright Act came into force in the U.S.A. Research had shown that most library photocopying was within 'fair use', but publishers disagreed and established the CCC to collect royalties for copying other than 'fair use'. Not enough money has come in to keep the Center in the black, so the publishers are having to subsidise it. King Research are to conduct a survey of 500 libraries and 150 publishers to ascertain the effects of the new American law so far. Turning towards the European Economic Community, one finds that moves to harmonize copyright law are conspicuous by their absence. In 1978 Dietz[8] had recommended harmonization based on the Dutch model, wherein there is a wide copying permission plus compensation payments for all other than personal-use copies. Dietz would have us pay royalties for personal-use copies as well, and his study seems to have been made with too little reference to the needs of education and research. A written answer to a question raised in the House of Commons on 11 July 1980 indicated that such harmonization moves as may occur in the foreseeable future in respect of printed matter will mainly concern the duration of copyright. Indeed, there would seem to be no haste towards EEC harmonization in detail, and this should give us all ample time to consider whether we should try to ensure that reasonable parity with other English-speaking nations will result. It is noted that the U.S. Copyright Act of 1976, which came into force in 1978 along with associated Guidelines, introduced 'fair use' for the first time and allows multiple copying for educational purposes.

Green Paper

Back in the U.K., the long-awaited Green Paper appeared in July,[9] and it confirms the present limited EEC harmonization plans. However, other parts of the Paper are naturally of much more immediate importance, though only reprographic matters will be commented upon here. Whitford is followed in one respect, namely the Government's intention to limit the fair dealing for 'research and private study' exceptions in sections 6 and 7 of the 1956 Act so as to prevent their use for research towards commercial ends. The Government states the intention to retain the provisions for single copies to be made within fair dealing, but to consider limiting the library exceptions in section 7 so as to exclude 'the related production of multiple copies of the same material'.

Although some mention is made of schools, a little specific guidance addressed to educational institutions about multiple copying and the use of office copiers could have been helpful at this time.

Then, rather than consider writing licensing into the law, the Green Paper suggests that it is possible within the present legal framework: 'If copyright owners consider it desirable, it is already open to them under the existing law to band together and establish licensing schemes and negotiate with the different groups of users'. Finally, it is proposed that a Copyright Tribunal be established to arbitrate on such matters as terms, conditions and rates of payment.

Professional librarians, concerned for the well-being of education and research, cannot but be pleased at the retention of fair dealing single copies. Other matters will be touched upon later. Currently, the U.K. copyright law debate is in a state of limbo. Only two signs of stirring can be seen just now: firstly, the preparation of comments to send to the Department of Trade; and secondly, the realization that it is up to us and other user groups to discuss with the rights owners the various problems of copying outside fair dealing. The ACC/AMA group has already reacted in the press with a warning to LEA's 'not to enter into any deals with publishers or rights owners on copying in schools and colleges'. They are to make representations on the Green Paper 'to secure the maximum freedom for students, teachers and pupils to use copied material for educational purposes'.[10]

The law and the literature

The present law consists of the Copyright Act, 1956[11] supplemented by the Copyright (Libraries) Regulations, 1957.[12] The published literature ranges from reports on possible law reform, through textbooks interpreting the law with varying degrees of detail and authority, to statements based mostly on conjecture or emotion and therefore to be regarded as of dubious authority. Between the extremes of authority and conjecture stand several pamphlets produced by the rights owners; the British Copyright Council's helpful statement of what would be regarded as fair dealing,[13] and codes by the Music Publishers Association Ltd.[14] and the Periodical Publishers Association Ltd.[15] Users were only involved with the music code.

The focussing of attention on the present state of the law has brought to light an apparently novel interpretation. The 1956 Act allows, as general exceptions in s.6 (1), 'fair dealing': firstly for research or private study (the umbrella for all who take single personal copies of reasonable extent, be they users of coin-operated machines or individual members of a commercial firm); and secondly for criticism or review (the umbrella for all abstracting, listing and reviewing services). 'Fair dealing' is not defined in the Act, but can be taken to mean activities which do not constitute publishing and therefore should not damage the publishers' market.

Educational copying is specifically provided for 'in the course of instruction' but otherwise than by the use of a duplicating process (s.41 (1)). In s.49 (1) there is a supplementary provision regarding interpretation, from which it is clear that any textually unqualified reference to 'a work' or the like means 'a substantial part thereof'. The specific provision for educational copying can therefore be taken as relating to a 'substantial part' or indeed the whole work when the copying is manual or from dictation. No definition of 'substantial part' is given. Parts of lesser extent can be regarded as covered by the general exception on fair dealing in respect of research or private study. Although libraries are the only bodies specifically authorised to provide a service and therefore use duplicators, and their activities are limited to single copies of reasonable parts, there is no comparable reference or restriction which would forbid schools from making multiple copies of reasonable parts. Hence, according to this interpretation, it should be possible for schools to produce and distribute to pupils any number of copies of copyright material, without infringement, provided the parts are not substantial. In other words, it would be necessary to prove that an item were a substantial part before infringement could be proved.

In contrast, the interpretation found in many texts, not least by a fellow librarian, L.J. Taylor,[16] and by the Council for Educational Technology (CET),[17] is that multiple copying should not be done anywhere of U.K. material without permission. The possible new interpretation which has been put forward does not appear to have occurred to Carter-Ruck and Skone James[18] and other distinguished writers on copyright law. Of course, no amount of repetition in the literature or statements by the rights owners can change the force of the law as it stands, and it appears that the new interpretation could well be feasible. But whether the government intended it in 1956 is unclear. Therefore, it is not proposed that anyone should make multiple copies, even of small items, without further investigation.

Case law could confirm or deny the interpretation. The only two cases to date, however, related to complete works copied by machine. In these cases, brought by the Music Publishers Association against a local authority (Wolverhampton) and a public school outside LEA authority (Oakham), infringement was proved and admitted, damages being awarded.

As remarked earlier, little is said in the Green Paper of copying by schools. It would seem inappropriate to consider that schools have necessarily broken the law, albeit unintentionally, except when they have copied large portions or complete works instead of buying copies. Perhaps sufficient has now been covered to provide background for a critical review of the case for the rights owners.

A case to answer?

In 1980 there appeared an almost passionately partisan study by Gros[19] which was reviewed by Bernard Williams.[20] One could be forgiven for regarding the work as so frequently requiring refutation that a much larger work would be needed to answer it. Perhaps there is some deep political truth to be learned here about the difficulties of defending the status quo against subversion. It is to be hoped, however, that the rights owners will not regard our lack of detailed response as indicative of our acquiescence, much less our guilt.

For some of the real roots of rights-owners' discontent, one must go a little further back in time to two surveys of photocopying in schools.[21,22] Quotations from the small English and Welsh sample survey in the autumn of 1974 have appeared in the press as though the extrapolated results are absolute fact. For example: 'Why schools break the law 200m times a year' is the headline of an article in *The Sunday Times* of 22 February 1981.[23] The surveys seem statistically questionable in method and analysis, the 1974 survey includes single copying, there was a flood of music copying because the autumn term was chosen, and the declared amnesty situation doubtless had a 'stocking-up' effect.

However, even when drastically slashed to allow for faults, the figures would be large enough to cause concern to schools as well as rights owners. A diet of photocopies may not only be less than legal but also administratively costly and bad for the growing child. The figures cannot be current though, for LEA's contacted all schools after the music infringement damages cases of Wolverhampton and Oakham. But it is surely wrong to keep on quoting figures which may not even be accurate, let alone representative of the current situation.

In February this year, Maureen Duffy, representing writers, addressed to librarians an impassioned and sincere plea for aid,[24] pointing to the low economic state of publishing and the plight of authors. We would of course like to help, but we are short of money like everyone else. Also, the justice of the case seems a little dubious and could be taken as typical of the misunderstandings that have arisen, probably because librarians do not talk sufficiently to other groups in the communication and information world. Maureen Duffy would wish a levy to be paid on all photocopies, or else on the machines used, to The Authors' Lending and Copyright Society Limited (ALCS) for distribution to writers. Most photocopying is surely of scientific or technical material, and there is probably little of concern to the ALCS. In any event, as stated elsewhere, librarians feel strongly that single copy privileges for study and research must be preserved.

Serials

The publishers make much of the serials photocopying situation. They believe that libraries are cancelling subscriptions because they can rely on photocopies obtained from other libraries, despite studies made to the contrary in the U.K.[25] and the U.S.A.[26]

For some years, academic librarians have tried to apply a rough rule-of-thumb balance between books and serials expenditure. One could never afford to buy all the serials that might conceivably be relevant. Users are encouraged to use the very wide range of expensive secondary services and have recourse then to interlibrary loan as necessary, for that way they can cover a great many more sources than any individual library can afford.

Interests are always changing, so serials subscriptions are kept under constant review. However, serials have become out of balance from the rough fifty-fifty that used to apply, because of strong academic resistance to cancellation together with disproportionate price rises, and may exceed books.

Subscription factors have to be considered in conjunction. Coining a formula, they are:

> Subject relevance + quality + teaching/research need + affordable cost = degree of desirability.

Note that 'need' may be expressed by the interlibrary loan staff reporting that a title's current or previous year issues have been borrowed more than three or four times in the last year. It should also be noted that the average total cost of an interlibrary loan to a borrowing university library is now well over £3,[27] representing a deterrent.

The worldwide library economic situation demands that all recurrent costs be kept under continuous review. When publishers increase a subscription cost, some libraries somewhere are likely to cut it, but they will be those where the other controlling factors are the weaker. However, because for many journals libraries are the main market sector, publishers who find they still fall short of their profit target then increase the price again. There is also a possible reduction in advertising revenue when advertisers find that circulation figures are down. Thus starts a crazy spiral, in which no-one wins and a relatively small group of subscribers could find themselves left holding a very expensive baby. The main loser is really the library researcher, for interlibrary loan delays are often unacceptable, and risks of duplicating expensive research can increase.

Recently, two publications appeared which could form additional background to this paper. The first, by Curwen,[28] has interesting chapters on the 'quantitative aspects of journal publishing', and another on 'innovation and copyright' which includes a brief assessment of the feasibility of 'on-demand publishing'. The second is a British Library Research and Development Department Report of the Royal Society's study of the U.K. scientific information system,[29] the main conclusion of which is that: 'a combination of pressures will very soon put the scholarly scientific publication system of the United Kingdom, as of other countries, under considerable strain'. The strain is on the free-market basis, and a dual approach is suggested:

(a) subsidy to publications, directly and/or via page charges (so far avoided in the U.K.)
(b) increased support for libraries.

The Royal Society report quotes some figures from the Standing Conference of National and University Libraries (SCONUL) on expenditure during 1974/5 to 1978/9, showing that total library expenditure rose by 97 per cent over that period, the Retail Prices Index rose by 81 per cent, but average British journal prices rose by 120 per cent. With scholarly journal sales to individuals continually falling, 'Sales to libraries have ... become the mainstay ... Serious reductions ... have therefore very serious consequences for publishers'. Yet elsewhere it is noted that, in the Royal Society's survey of British primary journals: 'most ... obtain about 35 per cent of their full-price circulation in the U.S.A. and typically no more than 15 per cent in the U.K. ...', and hence there is dependence upon 'budgets and policies overseas, especially in the U.S.A. ...'. Study of the survey results suggests that the part played by commercial publishers in British scientific journal activity, as compared with learned societies and the like, is not as big as one might think in terms of number of titles, but neither is the effect of British library budgets in terms of payment to U.K. journal publishers, commercial or other.

Although they can be started by inflation, price spirals can rise faster than the inflation rate. The publishers must surely realize the dangers of pricing their products out of the market. Yet spirals are becoming evident in certain books areas also, especially in Science and Technology. At present, as far as their attitude to libraries is concerned, it would be preferable if the publishers could accept that, just like us, they are at the mercy of the general economic climate, even if the cut is once-removed and the mercy seems to get less. Librarians do not complain of the high percentage of individual periodical articles that are irrelevant to their needs, but try to judge coverage by quality as well as quantity, and pay for a subscription to all issues, possibilities of serendipity being scant consolation.

On-demand publishing

Alongside the development of the electronic journal, the publication of separate articles instead of journal issues seems the inevitable future, perhaps as an on-demand service. Four publishers are said to be co-operating in the creation of an organization to supply individual articles, perhaps based on EURONET studies.[30] One hopes this will be done alongside the BLLD facilities and not wastefully attempt to supplant them, as has been rumoured. Such a move was the subject, early this year, of a survey by the Printing Industries Research Association on behalf of the publishers. If separates were published instead of journal issues, as forecast by Bernal many years ago, it would be interesting to see whether they became definable as monographic items and therefore complete works. Perhaps future legislation should refer to quantity of material rather than book or journal.

Communication and information chain

The progress of U.K. copyright legislation is seen by Campbell[31] as contributory to 'the development of an orderly chain of information transfer: author to publisher to bookshop to libraries to user'. He suggests however that the chain is now becoming too expensive for the market: 'Once one library has bought a copy . . . it can supply on demand photocopies to other libraries; teletransmission of a document in digital form would take interlibrary 'lending' a stage further'. Here there are really two points: lending and fair dealing copying; but in interlibrary lending the two overlap, and publishers have allowed this overlap to influence their attitude to fair dealing copies. Campbell apparently lays the blame for the price spiral upon libraries' opposition to the payment of royalties, saying that: 'As a result, publishers have to charge more for fewer copies . . . '. The reasoning is questionable, of course, for there is no proof that more copies would be sold. Information needs generating and the generation process involves a bigger chain, that of communication and information, in which education and research are vital links and upon which publishers themselves depend for their raw material. Any economic blow by publishers to a link becomes a self-inflicted blow, and some of the larger publishers show their appreciation of this by their response to multiple-copying requests for educational purposes. Even at its simplest, the chain is really a loop overlaid by other loops. (See Fig.1).

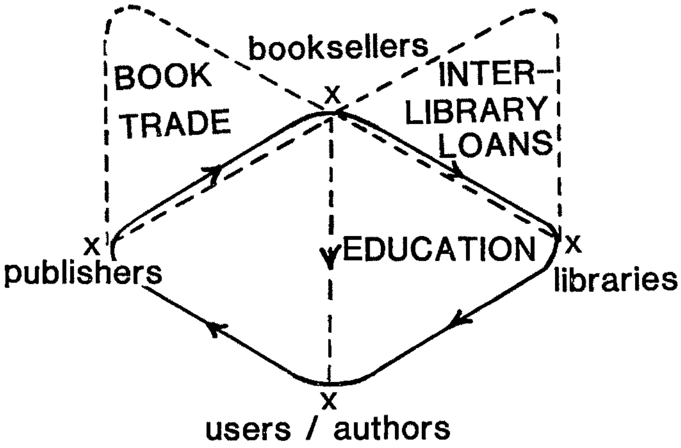

FIG. 1. *The communication and information chain*

In the 'Book trade' loop, increased efficiency in pricing, distribution and stocking could increase sales directly to users. Seemingly heedless price spirals could be replaced with a balanced pricing policy aimed at selling as many copies as possible at a price optimized to obtain a reasonable return. At present, publishers tend to predetermine the fate of their products by over-pricing them. Educational users form a strong market sector for direct sales by booksellers, as well as for library and information service.

Interlibrary loan, so essential because no library can stand alone, provides a means of sharing copies in a very limited manner. In theory, the publishers are right to say that only one copy might be bought and placed in the BLLD but, in practice, interlibrary loan is no substitute for possession, and libraries sufficiently interested in a work prefer to purchase it, funds permitting. Interlibrary loan should be seen as a market force, or at least a market indicator which publishers should heed. When a price is considered unreasonable for the expected extent of use, fewer individual libraries buy and the inevitable result is that more enquiries have to be routed to interlibrary loan. Publishers have spent a lot of time and effort on the photocopying situation of late: perhaps their time would be better spent looking at just what kinds of material are most frequently borrowed from other libraries and why, and then adjust their publishing and pricing policies accordingly.

More importantly, the whole should be seen as a more or less *closed economic system* in terms of realisable profits.

If schools or libraries have to pay more—whether per book or serial or for photocopying royalties—they could then buy fewer items overall and the publishers would not gain. If library and education budgets were flexible and generous, money could be drawn from outside the system, but they are lean and seem doomed to get slimmer. 'Users/authors' however form a possible node for incoming funds, provided more copies could be sold directly to them. Overseas market sales could be expanded, especially if piracy were reduced, provided the prices were right.

All this points not only to pricing policies and book trade efficiency in general, but also to forms of publication which might be more attractive to users. For example, students offered 'readers' or anthologies of selected articles or book chapters, tailor-made for specific courses, might find them more convenient than individual photocopying, and cheaper if royalties were made reasonable. This would mean a shift of funds out of photocopying and into book sales and therefore into the system from outside.

Rights and wrongs

In suggesting that budgetary cuts were encouraging libraries to resort to photocopying 'and duplicating' of copyright material, John Davies is reported as calling this 'morally and legally indefensible'.[32] Whilst no court of law is a court of morals, it is a purpose of the law to strive for a balance between people's notions of moral entitlement. Perhaps the presence of computerised information services, with their charge for 'use', whether or not a copy is also made and charged for, together with the establishment of Public Lending Right, are encouraging copyright owners to think in terms of recompense related to the use made of a work.

As Parsons has written:[33] 'The history of copyright is . . . a history of the changing views of society as to where the line should be drawn between the rights of the individual and the interests of the general public'. Whether the database producers pay authors a royalty on every visual display unit screening is a matter for them to cover by contract with the authors. But whether they should be able to pass on a royalty charge via intermediaries to the users *ad infinitum* is another matter, and one which will take much discussion to sort out. Whilst the computer services are still making their own rules via service agreements, such charges will no doubt continue.

When computer services proliferate and are publicly accessible, the rights of the user must be properly defined and balanced with those of the database producers and authors.

Kinds of copying

With regard to photocopying, however, what kinds of copying are there? Multiple copies for educational purposes have been discussed already to some extent and will be mentioned again later under Licensing. According to the survey reports already described, the material replicated in schools ranges from one-page graphic or text items to whole books. When produced for a particular class, the copies being of reasonable extent and retained by the pupils, this kind of copying could be regarded as fair dealing. Such copying surely does not constitute publication nor take the place of purchased material. After all, each pupil's copy could be considered equivalent to a private study one made by a library copying service, if a service were available in the school. But some limit might need to be placed on multiple copies if they were made for repetitive class use, handed out and collected later for further classes, as some of these could be taking the place of purchased material, and the rights owners' could maintain that at least their permission should be sought.

The law is silent on the addition of photocopies to library stock, as remarked by Taylor[16] (p. 35–36). Academic libraries could wish for clarification and/or agreement with the rights owners, for photocopies could greatly assist student access to journal articles as course material if only permission could be waived or rapidly obtained. Such copies would not save purchases, but could help to cope with rare or temporary peaks of demand, incidentally reducing the number of student photocopies made and lessening the risk of vandalisation of originals. There could however be moral objections if the original is not also in stock. When vandalisation occurs, originals need to be made good either by purchasing new material or, if the extent is reasonable, by photocopying another original and re-binding. Copyright material is liable to become associated with working papers for a committee and be replicated for all members. After use, the copies reside in private files, and there would seem to be no moral objection to this kind of copying but, again, it is neither expressly prohibited nor permitted in present law.

There remain by far the largest number of copying acts, namely the fair dealing single copies. Marshall McLuhan has said: 'Gutenberg made everybody a reader. Xerox makes everybody a publisher'.[34] Copier, maybe; publisher, no: the copies do not get distributed or offered for sale. Indeed, it is believed that a lot of them finish up in personal files and may never again see the light of day. There seems to be an unfortunate tendency in some library users to regard copying as equivalent to reading, especially among busy people who do not, like students, have to give some kind of proof of reading and understanding. In such cases, the number of copies would represent the number of interested 'looks' at an item, but not the number of 'uses'. In effect, single copies are a means of deferring the act of further study to another place and time, or an *aide memoire* for those who have studied an item on the spot but wish to quote it in detail at a later date in association with personal work.

Photocopies may be requested as such from any local library or from the BLLD, in which case they are clearly fair dealing single copies. Alternatively, requests for loan of a serial article may result in the supply by BLLD of a photocopy, particularly when there would otherwise be a heavy bound volume to transport which would 'tie down' or render many other articles inaccessible until the volume were returned. These copies are supplied with a fair dealing declaration for a signature by the user, and in effect they merely anticipate or take the place of copying by the user himself. The Board of Trade regulations[12] contain some limitations, such as 'no copy extending to more than one article in any one publication shall be made', but the obvious implication is that this applies only when one person and a particular day or copying event is involved. The regulation would otherwise be impossible to apply in providing service to any group of individuals. Librarians therefore regard such BLLD copies, which the rights owners consider to be a form of multiple copying, as fair dealing single copies also.

It would seem desirable therefore to regard the following as forms of 'convenience copying', to coin a phrase:

(a) multiple copies of reasonable parts as class handouts for retention, when the original is owned by the institution;
(b) fair dealing single copies, whether by BLLD, an individual or his library;
(c) copies of reasonable parts to restore damaged originals in libraries;
(d) a limited number of copies of reasonable parts of originals held in library stock, for loan in place of complete originals (educational institutions only);
(e) a limited number of copies of reasonable parts for committee members, or for criticism or review.

No rights owner should be concerned about convenience copying, as there appears to be no reason why the market should be damaged.

The following might be considered as 'quasi-publication' in one way or another:

(i) class handouts when original is not owned;
(ii) copies of substantial parts or complete works for repetitive class use;
(iii) copies for addition to library stock when the original is not held also;
(iv) copies for sale for purposes other than research or private study;
(v) multiple copying as represented by publication in another form, such as a course book or anthology.

Whether (i) to (v) are all to be regarded as *non*-fair dealing, as well as (a) to (e) as fair dealing, could be matters for agreement in a code of practice.

There is of course no copyright in ideas. Not even the publishers dispute the right of any person to copy out all or any part of a work in longhand for his own research and study purposes, so why should they complain about fair dealing because it is so easy to make copies nowadays? If the copies were sold secondhand on the market, one could understand. Perhaps there really is no logic in the rights owners' argument, but rather a knowledge that a lot of money is spent on photocopies and a simple desire for a share. The fact that any payment to them would be additive and, on the scale they have proposed, both punitive and destructive of wide-ranging research and education, as well as self-defeating in terms of net results, does not seem to have occurred to the rights owners.

Most UK articles that are photocopied have probably not been the subject of any agreement or payment between authors and publishers. To whom, then, would 'royalty' payments go? One could perhaps be forgiven for thinking that, unlike Public Lending

Right where fiction authors were crying for bread, this is a case of the publishers asking for cake at the expense of education and research.

The Green Paper proposes the limitation of fair dealing provisions so as to exclude 'research carried out for the business ends of a commercial organization'. Putting aside the problems of defining what such an organization is, there being a large 'grey area', it is difficult to see the reason for such limitation. Firstly, scientific, technical, managerial and related research can ultimately affect industry and commerce regardless of where the research was carried out. And let's not forget the dependence of the whole nation on industry and commerce, of which the publishers themselves are part. Secondly, just how could copying in private firms be 'policed', short of a 'Big Brother' surveillance system? In any event, each industrial researcher is also a private individual and could have recourse to a copying service. The making and upholding of laws is a game of trust and penalty, even to the extent of trusting all to know the law and penalising all those who transgress. One could no more trace every person who breaks trust than observe all who commit traffic offences. And it's not simply a stop light or 'amber gambler' situation either, for there are many shades of behaviour. Therefore, those who make the law not only have to seek a balance between differing ideas of rights, but also consider how and to what extent wrongs can realistically be redressed.

Licensing

There are two Wolfenden Committee draft licences for schools, also proposed as models for other user groups. One is a blanket licence on a capitation basis, and the other depends on pages actually copied and would need records to be kept and made available for inspection. If the 1974 PA survey were accurate, and if the extrapolation could be regarded as viable and still current, the total cost per annum of blanket licensing for English and Welsh schools for the relevant charge rates would be around £1.3M.

Comparing the theoretical blanket licence total cost with the 1979/80 books expenditure in English and Welsh primary and secondary schools of nearly £50M, it would appear that, had a blanket licence costing £1.3M been in force, the rights owners would have got 2.6%. However, it would probably have been taken out of the overall sum available, resulting in lower book sales. Is this journey really necessary? Or could it be more sensible to make educational concessions via an agreed code of practice which would rule out abuses like the copying of whole items instead of buying them? As well as payment, the rights owners would be given right of access for the purpose of inspecting records in the case of Licence B. The users would gain freedom from the onerous and time-consuming business of seeking permission and, although only participating rights owners would be involved in a licence, it is intended that the licence would indemnify the user against actions for infringement by other publishers. Incidentally, the Green Paper's intention to rely on existing legislation for licensing offers no indemnifying support in turn to the Wolfenden Committee. Universities and colleges could be asked to pay 4p per page for books and 10p per page for journals. In universities, this would treble the charge rate per page, and is of course completely out of the question from the point of view of the user group, which is in any event not prepared to sign away the single copy rights of its members.

No thought appears yet to have been given as to how the scheme might be extended to industry and commerce, but thousands of separate agreements would seem both costly and cumbersome.

If limited largely to multiple copying, including only those single copies which fall outside fair dealing, some form of licensing agreement on a transactional basis would seem reasonable enough in theory. The administrative costs of the proposed licensing/collecting agency could however be considerable, constituting both an undesirable drain and a lever for continually raising the charges to the user. Therefore, if a collecting agency were deemed essential, it should have other related functions in order to keep overheads minimal and increase the possibility of getting value for money in terms of service. Even so, the negotiation of many separate licensing agreements would seem an unnecessary and avoidable exercise.

With regard to permission or clearance problems which licensing proposals claim to remove, Middlesex Polytechnic's special project is of interest.[35] In 1976 they set up a copyright unit to investigate whether copyright material could be 'customised' to accompany teaching programmes, including course books. The difficulties of getting clearance, with or without fee, are demonstrated. It was concluded that, when planning courses, the rate should be estimated as 1p per page per copy 'operated by several major publishers and liable to be emulated by others'. Perhaps the other 9p of the Wolfenden Committee's proposed 10p per page for universities and colleges was thought necessary to cover the running of a licensing and collecting agency? If clearance were made much easier, could such course book publication become considerably more popular with tutors and create a virtually new market? Students could prefer the material to be gathered together and funds could therefore be diverted from individual photocopying. The Middlesex Polytechnic's project clearly demonstrates the difficulties of getting permission to copy, with or without fee. The only large-scale clearance activities of a comparable nature which come to mind are those of the Open University. Neither need could have been answered by licensing as so far proposed, because the purpose of copying constitutes publication.

The period of over two years in which the publishers have been campaigning for their licensing proposals does not necessarily make them right. Perhaps one can now turn to alternatives which might be broader and more flexible.

Alternatives to licensing

(1) Codes of practice

These might be agreed between the rights owners and different groups of users. It is to be hoped that concessions would be made in respect of certain copying purposes, especially in educational institutions. It is understood that the Music Publishers Association has recently opted out of Wolfenden Committee licensing proposals in favour of a code of practice already agreed with users. The British Copyright Council's pamphlet was a statement, not an agreed code. If users could be trusted to hold to a licensing agreement, they could surely be trusted to adhere to a code of practice to the same extent. Such codes would render the trouble and expense of a mass of separate licensing agreements unnecessary. The rights owners would need to declare the kind of multiple copying or non-fair dealing single copying that could be done without permission provided payment were made and records kept. Payment could be made direct to a range of Publishers Association numbered accounts or to publishers themselves along with relevant records.

(2) Copyright agency
The following services might be provided by one commercial organisation, possibly associated with the BLLD but not acting in place of it, and applied to any kind of non-fair dealing copies:

(i) clearance processing for users and authors at home and abroad, in respect of UK materials and as agents for foreign materials;
(ii) collection and distribution of fees;
(iii) clearinghouse for bulk offprint supply and on-demand publishing.

Apart from need, the question is whether it would be viable or, like the Copyright Clearance Center in the USA, soon require publisher subsidy.

(3) Codes of practice plus copyright agency
The combination of (1) and (2) would seem worth considering. With (1) alone it would still be necessary to contact publishers for permission in respect of, for example, publishing portions of works in course books. In order to achieve the dual aim of maximum freedom from permission delays for the users and maximum aid to rights owners in getting fair payment, (3) would appear to be the better alternative of those proposed here. The establishment of centres in the major developed countries could assist information flow across boundaries, and a UNISIST study report[36] remarks: 'The need to obtain clearance for reproductions, translations, and eventually processing or displaying documents, . . . leads to delays or withholdings that are an objective barrier to information procurement.' Piracy abroad, that far great ogre than photocopying in the UK, would be unlikely to reduce as a direct result, but at least the losses might be offset by the receipt of some foreign revenue if there were a focal point for clearance.

A feasibility study would be needed, of course. As other people could well generate better alternatives, perhaps it could be made more general in coverage than (3) alone. Is it too much to hope that teachers, librarians and rights owners would collaborate in such a study?

Summary

The post-Whitford licensing proposals of the Wolfenden Committee have not been accepted so far by any authority. In particular their proposed removal of fair dealing rights has not been supported by the Green Paper and any future discussions will have to recognise this fact. It is difficult to see, in respect of most of the copying done, why the publishers claim it to be illegal or unfair; nor why they claim that all copying causes them economic damage. Were the publishers' lobby eventually to succeed in removing single copy rights, their action would be a self-inflicted blow, because they themselves depend ultimately on the success of education and research.

Nevertheless, it appears that something needs to be done about permission procedures for multiple copying and non-fair dealing single copies, as well as recompense where necessary. We must not only prepare our comments on the Green

Paper, but also consider opening discussions with the Wolfenden Committee. There are alternatives to licensing, and one alternative here suggested would need collaboration between users and rights owners in a feasibility study.

Merely adding a licensing/collecting agency to the communication and information chain would just add another mouth to feed, not bring in money from outside the chain. The following are suggested as some ways of drawing money from outside the chain:

more public funds:	*for libraries; for education*
publishers' attention to:	*pricing policies*
	retail outlets
market expansion:	*overseas*
	national clearance centre, e.g. to encourage course anthology publication
	separates and/or on-demand publishing

Perhaps we need all of them, plus agreed codes of practice and clarification of the present law in due course. Such legislation could contain some reinforcement of the codes of practice principle.

The questions posed by the section called 'A case to answer?' are left to team studies. However, should the publishers decide to press on independently with their proposals largely unchanged, hoping still to gain from future legislation at the expense of education and research, here is a small suggestion: before digging for the crock of gold at the end of the rainbow, they should perhaps ensure that they will not undermine their own foundations! Meanwhile, the motion proposed for debate is:

That so far the rights owners have exaggerated the case against photocopying.

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The case for copyright

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THOSE OF YOU who have been addicted to watching television for as long as I have may remember some years ago that the BBC produced a series called 'The Lions' Den'. The purpose of the programme was to surround a speaker with those whose opinions were most diametrically opposed to his or hers. One would therefore find Andy Warhol with the National Viewers and Listeners Association, Enoch Powell with the Campaign for Racial Equality, Ian Paisley with the Committee of the Provisional Sinn Fein.

It is therefore with some trepidation that on this occasion I dare to be a Daniel and defend copyright in this Lions' Den of librarians. My fears are only mitigated by the fact that I am here something of a 'poacher turned gamekeeper' in that for many years I worked in libraries: in a public library, an academic library and a school library service. It can therefore be said of me, as Abraham Lincoln once said of Stephen Douglas after a snide comment by Douglas on Lincoln's early career as a bartender: 'He has spent most of his life on the other side of the bar.'

There are two basic opinions about copyright that can be consistently defended with force and logic. The first is that the concept of copyright should be completely abandoned, that copying and piracy should be freely allowed. The dangers of such a course of action need little elaboration. It would enable publishers to steal works from other publishers and from authors without remuneration. Copyright has been in existence since the reign of Queen Anne and is currently supported by Her Majesty's Government, the European Commission and the United Nations for very valid reasons. These reasons have been clearly expounded in the words of A. P. Herbert: 'If creators be ill enough rewarded they will cease to create' and in those of Anthony Trollope: 'Take from English authors their copyrights and you will very quickly take from England her authors.' For this reason, British publishers are in general meticulous about the republishing of copyright material. Others who republish by photocopying are less so. Monetary gain is not the sole object of authorship, but, when textbooks which have taken years to complete are wantonly pirated, it must be said that their originators have justifiable cause for complaint.

The other consistent viewpoint is that of the Whitford Committee—that exceptions only cause problems of interpretation, that they should be repealed, and that all copying should be paid for. The exceptions to the law as far as reprography is concerned are those contained in Sections 6 and 7 of the Act—'fair dealing' for the purposes of research or private study. The 'substantial part' interpretation of Section

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49 should not be regarded as an exception. Rather it is a limitation, which makes it clear that copyright is vested not only in the whole of a work but also in parts of the work.

In current circumstances, looking from the viewpoint of a librarian, the problems in interpretation of the law which faces anyone who supervises a copying machine are considerable.

The recent Green Paper confirms that the taking of multiple copies by one user is outside the law. But what if a series of users circumvent this by coming to take individual copies? An interesting and as yet undetermined case on this issue is currently before the courts in New South Wales in the wake of the Australian Copyright Act. Unless libraries have radically changed since I worked in them, there must be a number of occasions when librarians are asked to provide more than one copy, a request that they would like to fulfil but cannot. There are also libraries in which machines are not directly supervised and consequently there is no real control over the copying.

Then we come to the issue of what constitutes a 'substantial part' of a work. The word 'substantial' is nowhere legally defined, and semantically it could mean either 'a large amount' or 'a part of any substance'. There might be good grounds for saying, for instance, that a diagram which encapsulates the whole message of an article is a very substantial part of the work, although it may only occupy half a page of the text.

Next, you have to determine whether the copy is being taken for bona fide 'research or private study', in which case it is allowed, or for use in the 'course of instruction at a school or elsewhere' in which case it is forbidden under Section 41 of the Act. The difficulties of establishing this in terms of student use are immense.

Copies may not be taken in a library 'established for profit'. The Green Paper proposes to clarify this by stating that copies may not be taken for the 'business ends of a commercial organization.' How is this to be defined? Is research in universities sponsored by commercial firms to be included?

In libraries, no more than one article from the same publication may be copied. How does one check that a reader does not come back and copy another article? No copies whatsoever may be taken from books without 'reasonable inquiry' to the copyright owner. How then do librarians deal with people who copy from books? What constitutes a 'reasonable inquiry'? Libraries must, on many occasions, be asked to provide copies from books as opposed to journals.

The person for whom the copy is made must pay a sum 'not less than the cost attributable to production'. Does the person always pay, or is it being charged to some departmental account—a procedure which is not specified in the Act? Do the costs 'attributable to production' include the costs of originally producing the article in which case a royalty should be paid to the author and publisher? 'Production' is the term used—not 'reproduction'.

These questions would vex a trained copyright lawyer let alone a library assistant. It is estimated that 114 million articles are copied under 'fair dealing' provisions each year. Journal publishers are in business and have to adapt to the situation. The number of journals published has not declined but the average circulation figure has—by around 25 per cent in four years.

Consequently, prices of journals have risen well above the rate of inflation. That is where the damage is being done, although copyright owners are under no obligation to prove financial loss in order to defend their property rights. If someone breaks into my home and steals my goods while I am at this seminar it will be no defence to say that I have plenty of money with which to replace the goods and therefore will not suffer because of burglary.

No one is trying to prevent librarians from exercising their rights under the present law. They can draw up Codes of Practice if they wish. However, I hope I have shown that the present law is too full of vagaries to produce a satisfactory Code of Practice for both sides, and that there is obviously a large amount of copying demanded in institutions which cannot come within the law and is thus subjected to lengthy and cumbersome permissions procedures.

It is for this reason that a licensing solution has been promulgated. Both the Whitford Report and the Green Paper press licensing upon the rights owners, the latter going so far as to announce that the Government will set up a Copyright Tribunal to arbitrate over fees. Licensing is not a new concept. It is intrinsic within organized publishing where one publisher makes a financial arrangement with another (e.g. a licence) which governs the right to republish material. The Ordnance Survey has operated a licensing scheme open to all local authorities, solicitors, architects, surveyors and copying shops in the United Kingdom in respect of the copying of their maps since 1945. Licensing schemes are being introduced in many other European countries: Scandinavia, Germany, the Netherlands. We are now under pressure from these countries to set up a reciprocal scheme in the United Kingdom.

With the advent of electronic document delivery services, the principle of charging for use will be established. No one is going to pay heavily to produce one electronic master and allow it to be freely copied thereafter. Such charges are a central feature of the operational LEXIS legal document service and the proposed ADONIS service for the delivery of scientific articles.

A licensing scheme will apply the same principle to hard copy print. Libraries will have the choice of operating within the principles of fair dealing and of facing actions of the type brought by the music publishers if they are found to be outside the law. Alternatively, they can take out a licence, pay for all copies and receive in return the right to undertake immediately copying which is outside the present scope of the Act and to pay for it retrospectively. The payment per copy will be on a pro rata basis according to the cost of the material: 2p per page for school books, 4p for all other books, 10p for journals. There will be a Copyright Centre which will process the records and distribute the revenue.

Assuming that the scheme as it stands receives the support of the vast majority of rights owners, it is likely to be introduced during 1982. The choice will then be yours—either to abide by the law or to pay for the wider facility to copy which a licensing scheme will allow to you. We are not trying to trample on anyone's rights, but on our side we must find a clear, efficient and effective means of protecting copyright in order that authors and publishers may continue to provide libraries with the range of materials which they require.

Discussion
SESSION FOUR

The following points were made during the discussion:

1. Schemes for licensing or payment for photocopying have proved difficult to construct, few are in operation and of these none are working well.
2. The journals most wanted on interlibrary loan are those with the largest circulations and the demand for those comes from large numbers of small organizations who would never buy the periodicals anyway.
3. Even the comparatively small amount of copying of the hightly-specialized literature is affecting numbers of subscribers as much, if not more so, than large volume copying of the more 'popular' scientific journals, because the unit cost of these specialized journals is very high and the numbers of subscribers are often only measured in hundreds.
4. The photocopying situation in the United Kingdom is in a mess. Single article copying may be acceptable, multiple copying certainly is not, but some means must be found to control *all* copying.
5. Schools and Universities are under pressure to spend less. A huge amount of photocopying is going on in these institutions and it was predicted that this would increase. Organizations which supply photocopying machinery are picking up income which should it was argued belong to publishers and authors.
6. At present the line between single copying and multiple copying is thin. If one student requires a copy and obtains it from the library, that is legal; if ten students require single copies of the same article, request and receive them separately, that is legal; if the library batches these requests or predicts the demand and runs ten copies, that is illegal, without first obtaining permission from the copyright holder.
7. The delicate balance between academic authors, learned journals and learned societies is being undermined. At present authors neither receive nor expect to receive payment. If publishers demand copyright royalties, authors may demand payment, thus potentially increasing the cost of the journal or the cost of membership of the learned society. The current pressuring for payment appears to come from the literary lobby.
8. One of the main problems with the Copyright Act is that it has not been tested in the courts. The suggestion was made that firstly the aim should be to satisfy the requirements of the interested parties, secondly aim for harmonization of practice with other countries and finally amend the Copyright Act accordingly.
9. An organization is needed in the United Kingdom through whom copyright negotiations can take place with other such organizations already in existence in e.g. Australia, Germany and Sweden.

The electronic future—impact on work and society

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School of Science and Society, University of Bradford

Paper presented at the fifty-fourth Aslib Annual Conference, University of Oxford, 22-25 September 1981

WE HAVE SLIPPED into a new society without quite noticing it, as a result of the electronic revolution, and we are still bumbling along in the old ways while a third revolution, the information revolution, is overtaking us. It is my function this morning to try to put a broader philosophical perspective on things, and for that reason I begin with an anecdote—with apologies to those of you who may have heard it before. You will know of the philosopher in education who had established an international reputation on the theory that children will not learn if they are not supported properly psychologically. And he achieved a reputation far and wide for this view. One Saturday afternoon he persuaded a couple of students into helping him lay a fresh drive at home, and they had worked hard and arduously at this task for several hours and completed it. They stood admiring its nice smooth surface when two neighbourhood children playing tag, in the heat of the chase, ran right through this. Our professor looked at the children's footprints and blanched and then became apoplectic. He began shouting and screaming at the children, yelling terrible things—obscene things. The students were aghast and said 'but Professor Smith, we thought you liked children!' He replied:—'Yes, yes, well I love them in the abstract but I hate them in the concrete.'

I am going to remain pretty much in the abstract today. I don't think I'm going to give you very much guidance on your day to day problems. However, I do think that a broad theoretical framework helps and I remind you of Emanuel Kant's dictum that there is nothing so practical as a good theory. I will try to provide that.

Now I cannot take time out to go over 14 million years of human history, which I would like to do to demonstrate the fact that the driving force in the cultural evolution of the human species and its ancestors has always been the emergence of new technologies. To be human means to be technological; to be human means to devise new ways of relating to the environment, relating to each other, improving productivity and getting things done. You will have to take on faith that every major change in lifestyle, every so-called cultural discontinuity—was preceded by, and caused by the emergence of a major new technology. So I will skip the pre-history, and simply start by pointing out that we have pretty much become used to the idea of the industrial revolution, but have not fully assessed the electronic revolution nor the information revolution. The electronic differs from the industrial revolution insofar as the industrial revolution, with minor exceptions, involved devices which expanded the human musculature. They were devices which lifted things, transported thing, dug

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things, crushed—very important for my home town of Bradford—spun or wove things, the operations that related to the wool trade and textiles in general. That was the industrial revolution.

The electronic revolution, in contrast, involved an extension of the human nervous system—telephone, radio (an extension of the ear), film (initially sight, then coupled with sound), television, of course, sight and sound, and then the computer—an extension of the brain.

When one looks at history often the changes brought about by technology do not involve one single invention or device, but a whole constellation of them. I won't belabour that point in view of the lack of time. But the electronic revolution brought about a profound shift in Western society. By Western society I include countries like Japan, Australia and so forth—most of the OECD countries but clearly not countries like Turkey. For the basis of the electronic revolution one could actually go back into the 1830s when Michael Faraday first began pottering around. But the full social impact of that revolution became manifest only in the middle of this century, that is to say in the 1950s, and there are a number of criteria which one can apply which indicate that a country like Britain in some ways may not have joined it until the early 1970s. Nevertheless, this new communicative society is profoundly different from mechanical society. And as with any transition it is good news/bad news. Some things which make life easier and some things which make life difficult.

The good news is that ancient institutions like war are rapidly disappearing from the scene in communicative society. I would like to stress that we are talking about that sector of global society which has moved into communicative society. Much of the world, unfortunately, is struggling to get out of the agrarian society into an industrial/mechanical society, and is still caught up in a mechanical mould where war is still a major institution. Just as during the height of the mechanical era, following the industrial revolution, that other great ancient institution, slavery, became abolished, so do we see that process happening now in respect of war.

Of more direct relevance to people interested in information and flows of information—one of the attractive things about moving into communicative society is that the political systems tend to democratise. George Orwell's paradigm on 1984 was clearly wrong—television was not a device where big brother could spy on the people; television in fact has proved a device whereby the citizens spy on their leaders. If you don't believe it, turn on your TV tonight—there is never a night when some political leader is not busy explaining why he or she did, or did not, do something—whatever it is they were doing, or not doing.

I will want to amplify that a bit more, but before we get too optimistic, let me point out that the outstanding problem generated by the shift into communicative society is the emergence of the post-industrial economy, which, in fact, is rapidly becoming an information economy. The greatest problem confronting Western society is the unemployment problem created by the accelerating pace by which technology is displacing labour. I will amplify on that in a minute.

So I will give you the good news first. The good news about democratisation. Let me begin by saying that the countries which moved into communicative society in the 1970s were the southern tier of European states—Greece, Spain, Portugal. The process is continuing at such a pace that the Soviet Union will democratise before this decade is out. I have made this statement for several years now to smaller audiences, but the first national statement of this forecast was on a Jimmy Young show on January 1st 1980. We were looking at the decade ahead and when I said that I would expect the Soviet Union to democratise before the decade is out, there were a lot of raised eyebrows. Since then we've seen the events in Poland and, what I think is extremely significant, not only the events in Poland but the fact that the Russians still haven't gone in. Contrast the situation with the late Sixties. In Czechoslovakia, they were in within a week. The Russians cannot afford an independent trade union movement to arise in Eastern Europe. There is no way they can survive that. The fact that they still have not moved, indicates the shifting flows of information and decision making which must be emerging in the Soviet Union. The reason why communicative society tend to democratise, is because of two major features of communicative society. The first is the enormous expansion in the physical infrastructure of communication systems. The second is the shift in labour force so that the information operatives have become dominant.

Let me amplify that a bit more. Information infrastructure—by that I mean per capita telephones, per capita TV sets, per capita radios, per capita private automobiles, the number of people travelling within the country—that is to say, transportation systems which move people around, as well as communication devices such as telephones, all these make the information systems leakier and leakier. Now I only need to remind you of the discussion we had earlier this morning, where the creators of information no longer have control over dissemination. And some of them feel they are losing out on this. Incidentally I do not quite like the argument of morality, because, let us face it, if for any reason at this stage in the game the publishers go out of business because they are not able to make a living in it, we all suffer. It seems to me that such a loss would be immoral. One should not knock the publishers for that reason. On the other hand, it must be clear to the publishers as well, and I think that was a very important point made this morning, that if you drain the swamp too much, you upset the ecology and everybody dries up. That is why I feel that the information community should move slowly: because we are dealing with an extremely complex system which you want to study in a lot greater depth.

Anyway, that was unsolicited editorial and I apologise. Let me get back to the increasing leakiness of the system as a result of new technology. Let me give you a very specific example. We all know that the Shah of Iran had the communication system tightly under control. He had the press under his thumb, TV, radio, people got checked coming into the airport. You know what he forgot? Tape recorders! The good Ayatollah's speeches were going from mosque to mosque on tape recorders.

When the Colonels took over power in Greece in 1967, they had certain ideals. One of them was to modernise Greece and they encouraged the development of the telephone system. Now by 1972 it had reached what I consider a magic number which I think is probably a critical point—20 telephones per 100 of population. Now there was also another unique feature about the Greek telephone system which is that you pay only for initiating the telephone call, you do not pay for how long you are on the line—that is to say, it does not matter whether you talk for two minutes, or 20 minutes, or two hours, it costs you the same. Now the Greeks, like the rest of us, are a loquacious people, and somebody did a calculation that the only way the telephone system could have been monitored effectively was to engage the entire Greek labour force in doing it.

What happens when there is a large and effective information network is that there begins to emerge an independent body of public opinion. The dictator has either to go along with public opinion—which means he has ceded power and is no longer in full command of the decision making process, or he must become repressive. As the Greek Colonels discovered, every time you get repressive, you alienate another group of supporters.

There is a second, and perhaps significant feature of communicative society, and that is the rise of the information operatives as the dominant form of labour. Now let me explain that a bit. 300 years ago it took 90 per cent of the labour force to work on farms to feed the other 10 per cent. The vast part of the labour force was farm operatives. Today, incidentally, if you look at the figures of the countries with advanced cultural systems, it takes about 2 per cent of the labour force to feed the rest. What has happened in the intervening period was of course the industrial revolution and the rise of the machine operatives. There was a time when the largest single category of employed labour was the machine operative. Today, the largest single category is the information operative.

Who are the information operatives? Let us begin by saying the information operatives are the people who have as their tools essentially the pencil and the telephone, or an extension of them. It can be pen, typewriter, teletex, or whatever—but it is essentially the pencil and the telephone. And there are many different kinds of information operatives. There is, first of all, a very small group which creates new information. Scientists, people who pull together statistics, create new insights, that sort of people—a rather small group. A very large group makes a living transmitting information. Those are the people in education, the mass media, technical salesmen, librarians, although the last are close to that third category, people concerned with storing and retrieving information such as library and information services, filing clerks, etc. Incidentally, the pressure is to move away from low-level information operatives like filing clerks, to high-level operators—librarians, people with computer or electronic information system skills. Another group, a very large group, spends time getting things organised—transmitting information from one group of people to another in order that they will engage in certain acts. Those people of course are the people in offices, the managers, the bureaucrats.

Lastly, there is a group we tend to overlook, a very significant group, the people who make a living receiving information—students. In Bradford, up until World War I the average lad of twelve spent at least half a day working in the pits or in the mills, and the girls in the mills, in shops and in the home. Teenagers were part of the labour force. If one hundred years ago, when we first went to mass education, we had suggested to our Victorian fore-fathers that mass education was not only a great idea, but let us keep the kids in until age sixteen—they would have been appalled. They would have said it's immoral and it will bankrupt the country. They would have been right: it would have bankrupted the country.

The information operatives as part of their professional duties, talk to each other. It is very difficult to control that flow of information. Peasants are very easily bullied. They do not know what is going on because, as part of their professional job, which is ploughing a field, they do not have to talk to anybody else. They may get together in the evening in a pub, but basically they do not have to communicate in order to do their job. Factory workers are not too different. They may need to talk to the person on either side on the assembly line but that's all. With information operatives it is quite the opposite. They are always calling each other on the telephone, writing each other memoranda, feeding stuff into the retrieval system, attending interminable conferences, listening to lectures. This type of worker is in constant communication with others. You cannot control the flows of information even if you tap the telephone lines.

Economic activity over the last few hundred years has shifted from food and agriculture, to manufacture, then to information—the most important single economic activity of post-industrial society is handling information. And the flows of information have to be free otherwise the system doesn't work properly. And that is the undoing of centralised authoritarian governments. That same process, by the way, is happening in every organisation whether it is a large corporation, a smaller business, or a classroom. We are going to see the flows of information drastically revised over the next ten years as the home computers come in—It is going to turn the education system upside down, kids are going to come in knowing more than their teachers. It is also going to turn the libraries upside down.

We heard the point raised this morning from the publisher of a large number of technical books: the chances are that the articles in it get read by only a handful of people. It is an enormous waste of paper, money energy and organisation. You put it in a central, electronic file once. The user will have instant access to it. That system does not exist at the moment but you should know that the people in marketing who are looking around for what is next in consumer items, are saying it is going to be the electronic home information systems. There are some forecasts which say that by the 1990s the average family will spend as much on the home information systems as it does on the family car. That is not an unreasonable forecast; it may even come faster. What will happen when the average family tunes in to the Prestel-type systems? What will happen when everybody has a wide range of peripherals including cheap printers? The whole publishing industry will change, and so will the libraries.

In spite of a lot of opinion to the contrary, the British economy as a whole, has not been doing badly at all. What has been doing badly is the manufacturing sector. The reason the manufacturing sector has been doing so badly is because the old, industrial technology has spread around the world. One of great mis-perceptions is that if we can only get it right with British Steel or British Leyland, we will be all right. We will never get it right with British Steel! The world has steel capacity coming out of its ears. The same is true for shipbuilding: however if one were to develop wave power devices by developing new information and new techologies, then one could create employment in the shipyards and heavy engineering foundries and create a renewable energy source to replace North Sea Oil and provide the government with valuable revenue. Many other new technologies are waiting to be exploited: coastal fish farming, single cell protein on which to build a dairy industry—for exporting cheeses. Or making London into the office capital of the world, by providing it with proper information and telecommunication systems, as well as education services. If these things were done, then one could be creating a shift into a post-industrial (not a de-industrial) economy.

The most important single input into modern productive systems is no longer land, labour and capital. Of course you need them, but the most important single input into modern productive systems is information. It is know-how—it is expertise, whether at the managerial or organisational level, or at the technical level. While everybody was moaning about the British economy in the 1970s the pound kept getting stronger and stronger. It had nothing to do with monetarist policies. After they were instituted, it started to level off and fall. It was dependent on North Sea Oil. The international banking community, the financial community, understood Britain had something that West Germany and Japan did not have—access to an energy supply, which in the 1970s was a limiting factor. Now let me just point out that North Sea oil has been there since long before the Battle of Hastings. What made it a resource was knowledge: the technical know-how to find it and drill it, and get it out; the organisational know-how to put together a skilled labour force, with scientists and geologists; to raise more money than the annual gross national product of the vast bulk of the nations on this earth.

I hope to publish a book early next year entitled 'The Wealth of Information', which is an update on the 'Wealth of Nation'. One of the things we still do not understand is the way a society increases its wealth. The most important single way is not by the slow accumulation of capital, to use Smith's term, 'industry and parsimony' (lovely term that, parsimony—you don't hear that very much these days)—that does help, of course, but that is not the major way. The major way in the past has been one of two: military conquest—you took away somebody else's resources, or by converting a non resource into a resource. To give an example of the latter, a thousand years ago Europe came out of the dark ages. We know that from our history books. Historians generally don't tell us why. It was the agricultural revolution of the 9th and 10th centuries, centred on the technology of the deep plough. That converted a non resource, woodlands, into fertile farmlands. There are many examples in history: At the moment, one of the greatest non resources around is sunshine. By 1986 cheap mass-produced photo-voltaic cells will be on sale. The general assumption that oil prices will keep going up will prove to be wrong: By the late 1980s oil prices will begin to go down because they will be competing with cheap photo-voltaic cells. That is of enormous consequence to third world countries, for example the 1973 oil price rise wiped out the surplus balance of trade for India. And there is the other factor. You remember I said that Soviet Union will democratise by the end of the 1980s. What is going to happen then is that the cold war will fall away and the huge sums of money and a huge amount of technical scientific and managerial energy will be released. Some of this will be applied to improving the inner cities and help solve other Western problems. However, I would expect an enormous energy devoted to making the Third World productive and to close the gap between the rich and the poor countries. During the 1980s I see things getting worse, but by the 1990s that trend will reverse. It is very difficult to cover a 4-year course in Science and Society in 45 minutes, but what I would like you to understand is that the most important input into modern productive systems is knowledge. And that accounts for the rise of the information operatives as the dominant form of labour. It also accounts for the fact that whereas manufacturing is declining, the knowledge industry of which ladies and gentlemen, we are all a part, is the most rapidly growing area in Western economy and will in due course be in the global economy as a whole. Once it becomes understood that our problem-solving capabilities are getting better and faster all the time, you will begin to feel much more hopeful. I am not a congenital optimist—in 1964 I published a book which was published by Penguin in this country, called

'Nuclear Disaster'. I was very afraid for what was happening to us. We were in a heedless arms race—nobody seemed to understand what war was like—what it was about. The environment movement had not really got started. Yet the seriousness of the problem was very apparent to some of us; social injustice was even worse than it is today. Yet by the late 1960s things moved very quickly. I did not understand it then. I think I understand it now, and what I understand is that one has to look at society as a rapidly evolving system. Cultural revolution by the way is quite distict in some ways from biological evolution. But the overall principle of variation and selection—things which work are things selected for and things which don't are selected against— when one understands that one understands the enormous power and implication of the technology with which we all work. That information technology is much more profound than the impact the printing press had on the Western society. The electronic information technology is not only a super printing press, but it allows us to solve problems which previously could only be solved inside our heads. It allows us to simulate things, it creates a problem-solving capability unknown in previous human history. And I would say perhaps for the first time in human history we now are entering an era in which it becomes possible to solve problems faster than they arise. So just hang in there over the next few years. It is going to be bad over the next two or three years—it is going to get worse before it gets worse—but after that we should start clearing out.

What I would like to leave you with is the thought that we are working in an industry which is changing human history. The information technology is more profound than the industrial revolution. And in fact it may have begun processes where you must begin to speculate on its theological implication. But I do not want to go into that—What I do want to leave you with is that when we get this transition right, the productivity of the global economy will be so great, that our children will move into an era of peace and prosperity unknown in previous human history.

RATIOS OF STAFF TO USERS

Implications for library-information work and the potential for automation

Margaret Slater

The aim of this research-based report is the provision of staff to user ratios for special libraries and information services. Figures based on existing norms are given. As prevailing ratios were reportedly less than ideal in many cases, qualitative exploration of optimal levels was also included in the study. Data of both kinds (normative and extrapolative or 'ideal') are presented and could serve as useful staffing guidelines for individual service managers, as well as input to wider system planning effort — e.g. for a whole organisational complex, a geographical area, or even for nation-wide manpower forecasting.

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C Armstrong

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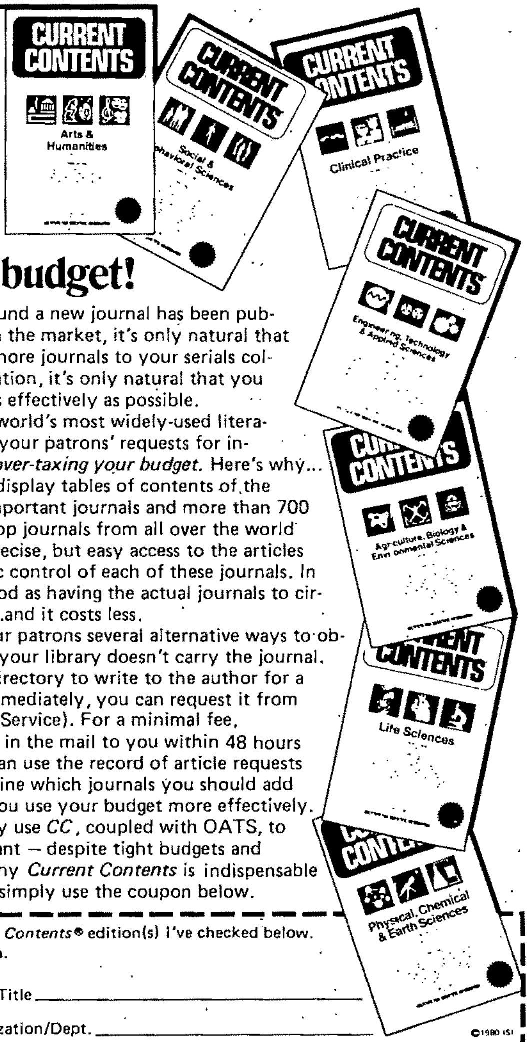
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British Library supported research in agricultural, biological and medical information

Margaret O'Hare

British Library, Research and Development
Department

Paper presented at the Fifty-fourth Aslib Annual Conference, University of Oxford, 22-25 September 1981

Introduction

I SHOULD LIKE to describe the work of the biological, argricultural and medical information Review Panels and examine their impact on the information scene in these sectors within the U.K.

The British Library Research and Development Department (BLRDD) has many years' experience of work in biology and agriculture and medicine, in the early days mostly concentrating on information source problems and database construction and testing. I need only mention MEDLARS, Index Vet, BA Previews, IFIS work as examples of this. But as the years went by, we began to shift the emphasis from 'source' to user, and more user studies and user education studies were supported. Around 1975 when we were evaluating and reconsidering the completed research we began to ask ourselves whether our priorities in subject-based research were meeting the perceived need of the actual 'end user'. We were well in touch with the library and information community, knew how they felt, how they reacted, what research they wished, but we were uneasy that in 'subject' areas, the subject end-users were not sufficiently involved. They were neither very involved at the inception of the research nor at the end with the results. Indeed, it was because of our concerted attempt to disseminate the research results to the end user rather than the information specialist that we began to ask ourselves whether these users, who were beginning to show such informed and critical appraisal of the research result, should not also be involved at the research planning stage. After all it does not make much sense to perpetuate research that we think will be good for 'the user' without asking their opinion in the first instance. But how could their help be gained? It was in considering this problem that the idea of the Review Panel was born.

Review Panels

These Review Panels consisted effectively of a number of eminent information users brought together to review the research already completed in their subject areas, to identify the gaps and to propose what research could be done to fill in these gaps. Members met over 2 or 3 years at a frequency or 3 or 4 times a year. In the membership we attempted to cover as far as possible all practitioner groups—academic, commercial, research, policy. The idea originally was not to include library and information experts

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on the Panels but to ensure that they had access to this expertise. A research officer was appointed to each Panel to advise them on information matters and to undertake specific small research projects requested by the Panel. It was not always practicable to ignore having library and information experts on the Panels and we organised their representation in later panels. The order in which we carried out the Reviews was Physics, Chemistry, Biology, Agriculture, Metals and Medicine, from which one can see that we moved from fairly tight disciplines to fairly broad practitioner areas and that, in itself, brought some noticeable variations in the research recommendations of the Panels. I shall describe the Biology, Agriculture and Medicine Panels in that order.

Biology

The Biology Panel was set up in 1976 and reported in July 1978 (BLRDD Report No 5438). After the sudden death of Professor Jepson, the Chair was taken over by Professor Campbell of the Courtauld Institute of Biochemistry. The Research Officer was Trevor Crane.

The Panel concentrated on the information needs of four subject groups:

- Experimental life sciences (e.g. biochemistry, microbiology, physiology, genetics);
- Descriptive life sciences (e.g. ecology, systematics, morphology, taxonomy);
- Behavioural sciences (e.g. psychology and aspects of sociology that come within the field of biology);
- The prevention and treatment of diseases (e.g. biomedicine, veterinary science and plant pathology);

noting, in addition, the different needs of academic and industrial biologists.

There were 23 recommendations in all, 12 specific to biology, and 11 of general significance to library and information matters. I shall mention only the key issues here:

- Review material is important and should be encouraged;
- A synopsis journal in the field of biology should be evaluated;
- Registers of research are important to the end user;
- Characterisation of data and repackaging of databases is important;
- Increased user education is necessary;
- A directory of sources for biologists would be useful;
- Staffing resources of information units needs to be investigated;
- Increased cooperation between secondary services is to be recommended.
- The organisation of personal databases could be helped by research.

The Report was circulated to every Head of Academic Biology Departments and to distinguishable focal points in other biology circles—e.g. secretaries of professional associations and societies. Specific response was elicited, but very little resulted. What little was received indicated somewhat surprisingly that enough money was already spent on information needs and services and that biology research money should not be diverted into information expenditure. However, user education was recognized as very important.

To comment on each key issue in turn, starting with reviews—how does one persuade authors to write them and editors to publish them? A similar argument applies to the production of a synopsis journal. We have however already carried out an evaluation of a synopsis journal in mechanical engineering which was not too pessimistic and thus biology publishers might have taken the risk of a similar publication but to my knowledge no moves have been made in this direction. Emphasis on registers of research as an information source has, in this and other subjects, remained a priority and is still a matter of debate at highest level in both the U.K. and Europe. The organisation of data for the information user is another priority issue. Mixed data and information banks must be a future area for research. A more practical requirement—a listing of U.K. databanks—was almost a universal recommendation of all Review Panels. It is pleasing to be able to report that the Science Reference Library has in mind to produce a new U.K. directory, updating the very out of date 'Data Activities in Great Britain'.

User education improvement, as one will see, was another universal Review Panel recommendation. In this area, we ourselves at BLRDD, as most of you will know, have made quite a lot of progress in the last few years. Not only do we have a full time Information Officer for user education at Loughborough University who maintains an extensive databank of materials used in user education, who advises and who disseminates 'good practice' ideas, but we have also pioneered the Travelling Workshops user education packages now produced commercially at Newcastle Polytechnic and one of the first of these produced was in biology. However, we are not yet satisfied that the research in user education is exhausted and particularly we are anxious to see if there are any special problems concerned with user education in practitioner fields. We have therefore recently commissioned an expert to carry out a study of the user education requirements of horticultural students. This study should report next year.

The recommendation for a directory of information sources has been followed up and a directory published this year (BLRDD Report No 5606—Dr. H. V. Wyatt). The debate on staffing resources for information units is another theme to recur throughout Review Panel deliberations, and one where it is very difficult to see where influence can be brought to bear to improve allocation of resources and qualified personnel. There is no single body in biology which can dictate or suggest staffing levels. Increased cooperation between secondary services is another requirement where it is difficult to exert influence, for such cooperation would only take place if any commercial benefit could be seen, and I therefore suggest this is a recommendation that must depend on natural market forces. It is interesting to note that the recommendation for investigation of methods for setting up personal databases just predated the current cult for micro-computer applications and electronic information storage. I predict that personal electronic databases will be the norm within a very few years, as micro computers become a desk-top tool. So one could say that this recommendation has been taken care of by natural forces.

I would like to mention now, and return to further debate later, the important distinction between recommendations for research and those for action that emerged from all Review Panels' reports. We had set up these Panels to advise us on research priorities but increasingly each Panels' recommendations strayed from research into action. In retrospect, one can see how this happened; for, on many issues, the evidence was already there for certain improvements to the system. No further research was thought necessary by the Panel who preferred to report on possible action points.

This was quite a tricky problem to report on, for the Panel could recommend action in general or by named organisations, but could one envisage the latter without consulting the bodies in question? On the other hand, unattributed action points lose some of their impact by their very anonymity. You will see how this problem was dealt with by the follow up to the Agricultural and Medical Review Panels where we ourselves decided to be more active in the dissemination processes in the hope that the right recommendations might reach the right agencies in a constructive fashion.

Agriculture

The Agriculture Review Panel commenced work late in 1976 and reported in May 1979 (BLRDD Report No 5469). It met under the Chairmanship of Gwyn Jones from the Agricultural and Rural Development Centre at Reading University and the Research Officer was Jill Craig. The Panel chose as its terms of reference:

- — To review past and current research on agricultural information, with special emphasis on:
  - (a) the sources and quantity of relevant information;
  - (b) the type and quantity of agricultural information required by the different categories of agriculturist user;
  - (c) the pathways of information flow within the U.K. agricultural community, and the degree to which agriculturists' information needs are being met by the sources of information available to them;
- — to indicate future information service requirements, particularly in relation to recent new developments in information handling techniques;
- — To define subjects for further investigation;
- — to set priorities for the establishment of such investigations.

The report contained 28 recommendations, some for action, some for research. The results were so wide-ranging that we decided to fund a formal dissemination process for the report and Maurice Rolls, the Project Head, organised 7 seminars in different geographical areas throughout the U.K. These were well attended and were extremely helpful, in that the debates aided us to reduce the 28 recommendations to six or seven main issues. Armed with the full report plus the report of the seminars, we ourselves called an eighth and final meeting in March 1980 involving on this occasion policy makers from government, industry, education and publishing. The discussion was frank and honest, and resulted in some appraisal of how the key issues might be tackled in the future. John Martyn has written a valuable resumé article in *Aslib Proceedings* describing the gist of the Review Panel report and the subsequent dissemination activities (*Aslib Proceedings* 33 (2) February 1981 pp. 46–52). The main issues in the Panel's report were as follows:

- — the need for a comprehensive directory of sources;
- — the need to control and organise the grey and review literature;
- — the need for qualified information personnel;
- — some examination of the power of information technology such as Prestel;
- — the possible need for central coordination of information activities;
- — the need for user education.

As I warned, the recurring themes of directories, user education and qualified personnel are in evidence. Production of a directory of sources is in hand with the Science Reference Library but it is still at the data collection stage. The grey literature in particular remains a very live issue, as is witnessed by the Aslib Biological and Agricultural Sciences Group's current interest in stimulating debate about possible ways of taming this renegade literature. We ourselves have recently commissioned a consultant to do a short, sharp study and report in December on how, if at all, further research can help in this situation. His remit also covered 'review literature' and is now completed and distributed to key figures in the agricultural information system. We come again to the supply of qualified information personnel and what can be done to improve the situation. This has to be a policy decision by bodies other than ourselves based on these research findings. It is interesting to note that out of the three Panels described here, the Agriculture Panel was the only one to place any emphasis on information technology. However, the agriculture interest was mainly in the potential of Prestel as a transfer medium to farmers' desks. As MAFF/ADAS and the EEC are actively pursuing research programmes, it is unlikely that we would stimulate any more until these results are known.

The pros and cons of central coordination of information matters, have been subject to continuous debate since the Panel reported but the consensus after the dissemination phase was, perhaps surprisingly, that central coordination held more threats than benefits and that some sort of regional or local coordination was likely to be more effective. And it is pleasing to note how many local initiatives have in fact taken place and groups of agriculture information specialists are now getting together to liaise locally. It may be that there is a lesson for all of us here—namely that synergism is preferable to, and more likely to succeed than, externally imposed directives. If the information of such local groups owes anything at all to the stimulus of the Agriculture Review Panel Report, as is suggested, we should be extremely happy.

Finally, to consider the recommendation for increased user education. How does one cope with this within our research policy? We can continue to fund research to advise on how to do user education, but we cannot directly stimulate increased action, except by experimental courses. As already mentioned, the BLRDD supported Information Officer can give advice on methods and materials but he cannot directly affect curriculum development, nor could he possibly cover all 'field' workers. It is relatively easy to catch users at some point in their formal education, whether at school, university or college and indoctrinate them in information access and use, but how do we catch the actual practitioners doing their daily job? An element of in-service training would certainly help. A study that we have only just started, and which aims to look in depth at the needs of agriculture advisers will, I am sure, cast some light on how they and others in the field could be instructed in information use. The investigation is to be conducted on a case study principle following through the work of the advisers to see what information they use and where they obtain it, and should report late in 1983.

Before I leave agriculture I would just like to stress again how valuable we found the dissemination phase and how gratified we were with the reactions of the information community. Also the Panel Report and John Martyn's article have had fairly wide coverage in the 'agriculture' press. This was not only surprising, but again very gratifying.

Medicine

The Medical Review Panel is the most recent to report. The Panel started work in 1978 and reported in April 1981. It met under the Chairmanship of Sir Ronald Gibson, the Research Officer was Penny Cockerill, and the Panel worked to the following terms of reference:

- To discover gaps and overlaps in the provision of information for doctors.
- To isolate factors affecting the use and non-use of information and to review the way in which these factors affected particular groups.
- To investigate whether material for such groups was provided in the right format and the right place.
- To investigate whether information services were reaching those most in need.

To achieve these objectives, the Panel chose to consider the flow of information in the following areas:

- Continuing education.
- Clinical information for treatment and other professional requirements.
- Local health-care services and facilities.

The Review followed close on the heels of a study by Geoff Ford on 'the provision and use of medical literature' (BLRDD Report Nos 5510 and 5515) and of course in previous years we had funded extensive work into the databases available in the medical field. So it was against this background that the Panel decided on its priorities, to avoid duplication of past work and rather to draw on its results when assessing all the evidence before them. The Panel did not concentrate exclusively on General Practitioners but was careful to include investigations of the needs of other medical groups, including those in the armed forces.

The Panel's deliberations resulted in 20 recommendations, 9 for research and 11 for action. Recognising that such strong call for action meant that we could not leave this report in the domain of the library and information community we have concentrated on its dissemination even more than any other Panel Report, trying to ensure that the relevant organisations are aware of the recommendations. In addition to informal discussions with the main agencies and organisations, we formally launched the report at a Press Reception at the BMA in early June last year. Attendance from the Medical Press and from the focal organisations in the field was encouraging but it is too soon to say what initiatives, if any, have resulted or might result from this effort. In general, the lead time from research in the information field to improved practice is very long so we shall just have to wait and see.

But to examine the recommendations. Out of all 20 I shall just mention the few key issues:

- The needs of community medicine should have priority study.
- There is need for increased user education at undergraduate level.
- The role of the Post Graduate Medical Centres in the provision of information needs further study.
- Abstract bulletins tailored to GPs needs should be tested.
- Registers and databanks of statistical data should be more rigorously established within the U.K. or Europe.

— There is need for a proper management structure in NHS libraries.
— Drug information should be more widely available.
— Some sort of Information Officer within the medical field should be tested.

Again there are a few perennial issues, but there has been some follow up already. We have accepted priority for some community medicine information needs study and have an outline proposal under current consideration. We do not at present plan to undertake any specific further research in user education in medicine but prefer rather to draw attention to the aids available to tutors and to the 'Health Care' TWE package available from Newcastle Polytechnic. The use of audiovisual aids might just bear further study in medicine, where students are familiar with using these for their clinical studies but we have not yet formulated a possible project. The role of the Post Graduate Medical Centres as an information point will be kept in mind by the Council for Post Graduate Medical Education in England and Wales in their assessment of such centres. But one must keep in mind that one can enhance the role of the Centres and equip them well, but cannot force doctors to use them for their information problems. Some re-education is necessary first and it may well be that current projects studying GP information needs at a local level are needed before the role of the Post Graduate Medical Centre is put into perspective.

An abstracts bulletins study has started as a result of the Panel's findings, funded by the Carnegie Trust for Universities in Scotland. A local initiative in the Lothians, where abstracts are written by a professional medical practitioner and are designed to be read not only as an adjunct to the original article but also to stand alone, has been undertaken. In this last aspect the study is novel in creating a hybrid between the abstracts bulletin and a secondary synopsis journal. It will be interesting to see from the results of this study the acceptability to GPs and whether they consult the full article or not. Creating registers and statistical databanks in the medical field is rather beyond our remit but the need is already well recognised by the DHSS where a committee chaired by Mrs. Korner will report on this issue. When we see this report we can reassess the need for further research.

The management structure issue is a very live one, especially as the NHS is on the brink of major restructuring. We have taken up the cause cautiously in a study we hope will be conducted by the Centre for Library and Information Management and expect that some of the results will appear in time to be useful to the NHS reorganisation. Drug information is an area where information flow is well researched and where excellent services abound. The Panel was of course concerned that not all data is made available and that adverse effects might be more extensively circulated. This is a matter for the professional bodies, the drug companies and the drug centres to consider professionally. We have taken the action required of us by the Panel and brought the recommendation before the Association of British Pharmaceutical Industries.

The idea of an information officer to advise medical information specialists on current and new library and information science techniques and practices is one which we may try out on a trial basis but no final decisions on this possibility have yet been made. One last point of interest with regard to the Medical Information Review Panel: the members have suggested a further meeting of the Panel at some later date to examine follow-up of their recommendations. When one considers how busy each and every member of this Panel is, it is extremely gratifying to report not only how assiduously they attended the Panel meetings and the Working Subgroups, but that in addition they were willing to give their time yet further to follow the Report's progress.

Impact of the Review Panels

Having described three Review Panels, I would now like to examine their impact in general and in specific. In the specific, I have tried to say what effect the reports have had in biology, agriculture and medicine information circles, but in general, one must try to compare this method of seeking expert advice in subject matters with other possible methods.

As I said at the beginning, the intention in setting up the Review Panels was (a) to interest the user community in the research, and (b) to be able to plan research programmes based on their ideas. So has the plan worked? I think it has in the first intention as members of the Panels have become so interested in information problems that they have spread the word widely among their colleagues. But has it worked as a method of planning research? In retrospect, perhaps the inevitable happened; the prescription suggested by each Panel for amelioration of their own information scene was not only, nor even in the main, for research but for action and implementation. We, receiving the Panels' Reports, had then to consider what to do about the recommendations for action and, as I have tried to explain, we attempted to do all we could without overstepping our remit. We recognised that future initiatives will have to depend on other agencies' policies and priorities but at least we have provided them with some data for decision.

Of course there are research recommendations in each Panel report and, after placing these in priority order, we have tried, and will go on trying, to support the appropriate research. In most cases this will involve soliciting research, but it is interesting to note that the Reports have had impact on researchers and we have received an encouraging number of unsolicited follow up proposals.

It could be argued that we would have achieved the same result much faster and at much less cost by commissioning an 'expert' in each field to furnish a Review. But would the user community, no matter how extensively consulted by the expert, accept the results? Would they not tend to regard the subsequent report as one person's ideas, and thus make it difficult for any follow up to be achieved? Also by this method we would have lost the increased awareness factor achieved in the user communities by the Review Panels' work. Another possibility would have been to assess the needs ourselves but frankly, we do not have time to carry out the extensive negotiation and consultation that this would require and anyway the reaction to the results might have been to dismiss them as administrators' ideas and therefore completely out of court, or at least, suspect. I would therefore contend that the Review Panels were perhaps the only way to achieve the consensus of opinion needed to provide a basis for future planning of research and hence ultimate improvement of information flow in these subject fields.

AUTHOR'S NOTE

The views expressed are those of the author alone and not necessarily those of the British Library.

Discussion

A. LUMLEY (COPR): It would seem from the total research funded by the BL Research and Development Department in recent years that a fair proportion of this has been in the subject fields of Biological, Agricultural and Medical information. Do you agree with this and is enough being done?

O'HARE: There are definitely outstanding problems but they are not always strictly 'research'. Systems builders are really looking for some implementation funds and we unfortunately cannot provide this. So should we press ahead soliciting 'research' which is in a sense unwanted by the profession who are already at the next stage looking for risk capital? We must try to think and plan ahead at BLRDD, and in subject based research this is not so easy. I am interested to hear the views of this audence.

S. M. D. FITZGERALD (Royal Botanic Gardens (MAFF), Kew): Subject based research is important because of the varying working habits of the different disciplines.

J. A. BRANDRAM (West of Scotland Agricultural College): Please expand your reference to user education in horticulture.

O'HARE: Professor L. Broadbent, now retired from Bath University, is conducting a small study into the particular user needs of horticultural students.

G. P. LILLEY (St. David's University College, Lampeter): Can anything be done to make Library/Information School *staff* more aware of the scope and interest of agricultural bibliography, information and documentation with the aim of producing more Library School students who have gained some acquaintance with that area?

O'HARE: We do involve Library School staff as much as possible in the dissemination of research results but agree that the impact does not always seem great. As a separate point I feel that there are often interesting dissertations carried out by Library School students that we do not get to hear about.

LUMLEY: The possibility of an ABASG meeting where current/recent research on biological, agricultural and medical information undertaken by post graduate students is presented and discussed, is being considered by the Committee. Also a workshop on methods of training users in the sources and use of information in these subject fields has been suggested for an ABASG meeting some time in the future.

R. M. JOHNSON (Edinburgh School of Agriculture): A case study is being undertaken at East of Scotland College of Agriculture (ESCA) concerning sources of information used by ADAS Area Officers (general advisers).

A. MILTON (MAFF, Reading): At Reading the Extension Development Unit is monitoring information to farmers.

FITZGERALD: There seems little demand in Public Libraries for agricultural literature.

P. E. MARTIN (MAFF): What prompted the choice of the main areas for the Review Panels to consider?

M. W. HILL (BL, SRL): The choice would have come from or at least been approved by the BLRDD Advisory Committee.

A. TAYLOR (ARC Food Research Institute): Was the trend towards greater publicity of the Review Panel reports merely a chronological effect or was it a result of moving into more strongly 'practitioner' areas?

O'HARE: This is an interesting question but I think it is coincidental that we were attempting wider and wider dissemination at the same time as getting into more practitioner fields. With the first review panels we circulated the reports widely but had little feedback, with 'agriculture' we tried Seminars—I think successfully, and with 'medicine' a Reception in June to launch the report—this has already had a good return. I must stress how importantly we view dissemination at BLRDD and devote a not insubstantial proportion of the budget to it.

N. W. BRUGGS (ARC, NIRD): The fact that the first review panels were for academic disciplines (physics/chemistry) may have been because of BLRDD being born from OSTI.

MARTIN: Has any work been done to cost any of the research proposals, bearing in mind that most of the recommendations are quite general?

O'HARE: I think it is fair to say that the Review Panels did not see this as their remit although we have in the later reviews tried to suggest that they might do so. I agree with the implied intention of this question about the follow up of recommendations. To have real impact it might be best.

J. GOODIER (ARC): Within the three Reviews we have looked at there is, in the recommendations, a trend; the Biology review was aimed at the level of professional biologists, the agricultural review at the level of advisors and the medical review was at the level of the practitioner. There factors may have influenced the way the reports have been disseminated.

O'HARE: That is an interesting point but it may only have been coincidental with our own trend to increased concentration on the dissemination of the findings. In the case of biology our dissemination was by circulation and therefore passive, for agriculture we had an extensive programme of seminars, and latterly for medicine a reception for the press and key organisations in the medical field. The two latter ploys have been very successful.

B. VAN DE LUSTGRAFF (PUDOC, Netherlands): The findings of the Review Panels are very important not only to the situation in the U.K., but also to that in the Netherlands. However, we have additional findings which are related to the traditional barriers in information providing. These are: document delivery, costs (of online searching especially) and geographic distance. What are the findings of the Panels about that and how do they see possible solutions?

O'HARE: The policy of having as Panel Members members of the discipline rather than information specialists, meant that they largely did not concentrate on 'documentation' management problems. They did not study document delivery as a separate issue but in general I would say their attitude was rather to get the *right* information than to get it extra quickly—except of course in drug and toxicology information. Costs of online searching were not specifically addressed during the Panel's deliberations but we have done extensive work in other BLRDD research areas on this topic. Geographic distance was considered by both the agriculture and medicine Review Panels where concern was that information service should be uniform whether the practitioner was located in the outlying countryside or in the towns.

Translation on a limited budget

C. H. A. Fleurent

Information Research, May and Baker Limited

Paper presented at the fifty-fourth Aslib Annual Conference, University of Oxford, 22–25 September 1981

> 'Could you arrange a literature search on the drug treatment of schizophrenia? By the way, references in English only, I cannot read foreign texts'.
>
> 'It's a pity the only review is in Russian'.
>
> 'We have had this letter from a company in Brazil but have not answered it as we do not understand Spanish, or is it Portuguese?'

I COULD QUOTE many more examples of linguistic difficulties facing the managers, research workers, salesmen and other staff for whom we provide a service. You are all familiar with the problem. Some of you cope with it using the resources at your disposal, sometimes scanty, sometimes considerable. Others would like to help their colleagues but are deterred, and I can almost hear them say 'Am I taking on more than I can cope with? How do I set about it? Can I do it at a time when my budget is limited and it is a struggle to maintain services and standards, let alone embark upon a new venture?'

The purpose of this paper is to allay these fears and suggest what can be achieved without undue expenditure, and how. It is essentially a practical exposé for which I will draw upon my experience at May and Baker Ltd, but I should, however, make it clear that I provide a full-time service with the assistance of one translator and one word-processor operator, which is a different matter from your providing an occasional translation service into English as part of your information or library services, which I now propose to outline.

Assessing the need for translations

Prospective users of your services may, or may not, admit that they have difficulties. These may be slight or great, occasional or constant; they may make all the difference to a manager's understanding of his work or his ability to do it well, not to mention his enjoyment of foreign contacts. For all these reasons, you will find it worthwhile to go out of your way to assess the extent of the problem. Discuss it informally with staff at all levels, send a short, simple questionnaire, with an explanatory note, above all do not forget those of your colleagues who never visit the library and whom you have not met. When you have finally analysed your replies, assuming that, one way or another, you have persuaded people to reply, you will need official approval for your venture, which is my second point.

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Managerial approval

This is essential. You may already have 'floated' your idea before sounding the staff. In any case, now is the time to present your manager with a succinct written appraisal of the problem facing your company's staff. This should list areas (research and development, licensing, patents, marketing, advertising, sales, customers and public relations, legal department, maintenance, engineering, etc.), the languages involved (from English, into Russian, etc.) and which of these could be included in your new service. Obviously you will not include Japanese, or any other language, at this stage if only one out of 75 potential users replied that he needed a translation from that language, and that only once in the last five years. You should refrain from listing any of the less 'usual' languages; in fact you may wish to limit yourself to what I personally consider to be the 'core' languages, namely French, German and Spanish, unless you have special reason not to do so. If, for instance, your company deals substantially with the Middle East, you will want to include Arabic, possibly Farsi. This document will also include the names of a few members of the staff willing to act as translators, an indication of the level of service to be provided—emphasise here that your aim is essentially to help staff out of their difficulties—and of the costs involved. Last but not least, you should mention that you would like to provide this service initially on an experimental basis, perhaps for six months, and that you do not intend that it should take up so much of your time, or that of your staff, as to prevent you from maintaining the level of other services.

The level of service to be provided

This should be defined from the start, perhaps even in the explanatory note which you sent with your questionnaire to the staff, certainly in your report to your manager. Initially, because you are starting from scratch and have to keep a careful eye on expenditure, you should aim at providing draft translations, by which I mean translations which will convey the meaning of the original text accurately but will not be polished and will probably require editing for style and correct terminology. Alternatively, you may arrange to translate orally, by appointment, as is done at the Bayswater Branch of the Science Reference Library. In other words, you will be satisfied if you break the language barrier and only do that, and the translation will be judged only on its comprehensibility. I must add that you have a duty to ensure that the user of a draft translation, indeed of any translation, is informed of the difficulties which the translator may have encountered. Thus, the two, the user and the translator, may be encouraged to meet to decide on the right interpretation of terminology, to their mutual benefit. It is also essential that users should know that draft translations are issued for information only. They should never be used as authoritative and legally binding documents, and their distribution should be strictly controlled. It is the practice at May and Baker to add a footnote to the title-page of all translations, stating that they 'should be used only in association with the original text', which disclaimer may not, in fact, be accepted by the courts, and, in the case of drafts, that they 'are issued as a draft for the use of May and Baker staff only'. You would be well advised to adopt a similar course.

To return to costs in relation to the level of service, I would like to mention the excellent contribution to this subject made by Richard Simpkin in his paper to the seminar on translation specifications held by the Translators' Guild on 21 November 1980, in which he made the point that an 'information standard' translation could be quicker and 40% cheaper than one of 'publication standard'. (See *Newsletter of the Translators Guild Ltd.*, 6 (1), Winter 1981, p.7).

Lastly, you should not provide a service for which resources are not available in terms of linguistic ability or subject knowledge, as a little expertise or knowledge can prove to be dangerous. In such cases, you should turn to professional translators and persuade management and users that this policy is in their best interest.

Dictionaries and basic reference books

Here you need to proceed with caution as you cannot afford to make the wrong choice. The guiding principle is that you should have the dictionaries best suited to your needs if you are to provide a reasonably good service. This has to be reconciled with the fact that dictionaries are very costly and their purchase will probably have to be paid for out of a tight budget. Allow £100 to £150 for each of your three 'core' languages. This sum should enable you to buy the best two-volume foreign language—English general dictionary and one or two technical bilingual or multilingual dictionaries. It is difficult to make do with less. If funds are inadequate, purchase the general dictionaries first and hope that your users will help with the specialised terminology—they usually do. A point worth noting is that the less familiar you are with the intricacies of a foreign language, the greater your need of a good general dictionary with a clear layout and well-chosen examples. As to dictionaries with entries consisting solely of strings of alternative words, they should be left to gather dust at your bookseller's. Lastly, a word on multilingual dictionaries. In my opinion, these often can be expensive in relation to their usefulness and reliability. They contain too many entries which are of little use. This applies particularly when terms have a common Greek or Latin root. Such dictionaries rarely provide translations of difficult terms and phrases which are acceptable to experts in the target language (language into which the translation is made). In this context, *Elsevier's Dictionary of Photography* is better than most. Do not, therefore, be impressed by the number of entries listed on the blurb when you contemplate buying a multilingual dictionary. Get it on approval if you can or, at least, examine it carefully and consult experts if possible. This being said, there remains the problem of finding out what is available, and I would now refer you to John Alvey's paper on 'Dictionaries and reference books for the translator' published in *Aslib Proceedings,* 31 (11), 521–524, November 1979 and to the bibliography on page 159.

Outside resources

No information officer, librarian or translator can work in isolation and, sooner rather than later, you will need outside help to track down the right dictionary or freelance translator and to check whether a translation is already available.

Aslib is one of the first organisations to which you can turn. Its Translations Department under Wendy Glover provides services relating to translation to corporate members of Aslib. The department keeps the Aslib Index of Unpublished Translations started in 1951 in a card index with approximately half a million entries and can be consulted by telephone, telex or letter. It is also responsible for the Aslib Register of Specialist Translators who are competent in a foreign language and in a specialised subject to degree level, and have to supply two references before their names are added to the Register. A useful tool is the Aslib Dictionary Index, a card index with details of location where available. It should be pointed out that Aslib does not examine dictionaries and cannot therefore make recommendations. For further details, please read Wendy Glover's article, 'Service provided by Aslib relating to translations' (*Aslib Proceedings*, 31 (11), 525–529, November 1979).

There is, of course, the Aslib Technical Translation Group or TTG, to which corporate members of Aslib may belong. The Group holds around nine meetings a year and arranges visits to places of interest to translators. Most of its members are staff translators. Some are freelances and others information officers or librarians with a part-time involvement in translation work.

Some of our meetings have included workshops, dictionary and unusual language forums and, recently, we have had papers on the production of BBC Radio German language courses and the importance of linguistics. We also try to keep abreast of technical progress, and meetings on word processors and other electronic aids are always well attended, as are demonstrations by manufacturers, usually as a part of a visit to their premises. Above all, the TTG meetings give members an opportunity to meet their colleagues, exchange ideas and seek advice.

In addition, the Group has organised one-day meetings ('Translating and the Computer' in 1978, with the Aslib Informatics Group, 'Machine Aids for Translators' in 1980, with the Translators' Guild of the Institute of Linguists). These meetings have been so successful that a two-day conference on 'Practical Experience of Machine Translation' was held in November 1981.

I have already mentioned the *TTG Bulletin*. The *Bulletin* celebrated its Silver Jubilee in 1979 and has a circulation of about 300. The Bibliography and Terminology Sections are particularly useful to anyone starting a translation service. I can only urge you to examine the *Bulletin* and judge for yourselves.

The reference sections of libraries, private, public and university, should not be neglected. For instance, the Holborn Branch of the Science Reference Library, which inherited the former Patent Office Library, has an extensive collection of dictionaries. The Westminster Reference Library caters more than adequately for the needs of translators, as do many large public library systems in the capital and provinces.

The Translators' Guild of the Institute of Linguists comprises the Fellows and Members of the Institute who work as translators. Like all professional bodies, it regulates admission of members by examination, ensures the observance of a code of professional conduct among its members and upholds the status of the profession. By its activities and influence, the Guild, with the Institute, has raised the standard of translations to the advantage of users of translations. You should consult a copy of the Index of Members of the Translators' Guild ready to accept commissions whenever you need a freelance. Do not pick a translator at random from the Yellow Pages. Selecting a professional translator should ensure a high level of competence in subject and language, and respect of confidentiality and ethical standards which you expect when you commission a translation.

It would be wasteful to translate a text when a translation has already been done and is easily available. I have already mentioned the Aslib Index of Unpublished

Translations and would only refer you to B. J. Birch's paper, 'Tracking down translations', published in *Aslib Proceedings*, 31 (11), 500–511, November 1979, and to Wendy Glover's leaflet, 'Translations and translation services, and related information', for further information on this subject.

The 'in-house' translators panel

One of your first tasks will be the setting-up of a translators' panel. If your company is research-orientated or employs highly qualified technical or professional staff, you may have a readily available pool of keen would-be translators, of whom only a few may prove to be efficient and reliable. Advertise your intention to set-up the panel, enlist the help of your Personnel Department, and do not forget wives whom may have worked in the company before marriage and be eager to use their professional skill and linguistic knowledge while minding the children. 'In-house' translators have many advantages: they know the company and the way in which it works, and are often preferred on the ground of security; there is closer co-operation between the translator and the user of the translation, which often results in a saving of time and money (part translation, reading out); they often have a good knowledge of the subject and its terminology. One of the main disadvantages is that the translation may be rough. The amateur is often afraid of turning a sentence round, cutting it into two, running two into one and, above all, of leaving out those small words which are essential in the source language and translate awkwardly, if at all, in the target language.

There is also the danger of occasional gross misinterpretation caused by insufficient knowledge of the source language. This is likely to occur in the less technical passages of the original text and, in particular, in the discussion which concludes a paper. In addition, staff translating in their spare time will rarely allow you to put on the pressure if the deadline is short.

To a limited extent, pitfalls can be avoided if you ensure from the start that your in-house translators have a good knowledge of the foreign languages from which they translate. 'O' level is inadequate. Your translators should have cultivated their foreign tongue further by reading, meeting native speakers, foreign travel or other means at their disposal, on a regular basis.

Translation agencies

This brings me to agencies. We all receive unsolicited promotional literature from individual agencies. If possible, use agencies which have been recommended to you. If need be, consult the Aslib Translations Department.

Commercial agencies are numerous, small, sometimes a one-man or one-woman band, medium and large; poor, average and good. Some simply act as a post-box between clients and translators. Some cover a wide range of subjects and languages efficiently and provide computer type-setting, proof-reading and printing facilities. Some specialize in one subject for which they have gained an excellent reputation over the years. A few like to bring translator and client together to ensure that the standard of the translated text is as high as can be achieved. If you bear all this in mind and avoid very small firms which claim to translate from any language into any language on any subject without ever having to face any problems in no time at all, if you also remember that even good agencies can be let down by their translators, whose work they do not always check, you should have no surprises. On the positive side, agencies offer a useful back-up service to 'in-house' translation facilities and often do it quickly. In fairness, you should provide the agencies, and indeed any translator, with suitable terminology and background material whenever possible. This can be in the form of data sheets, literature, publicity material, even a style book.

If the text deals with several subjects, ask that the job should be divided between translators according to subjects. This is not always possible but can sometimes be arranged. In the same way, be specific about the subject. Do not say chemistry when you mean physical chemistry or biochemistry. Ask that the translation should be done by a specialist translator. Give the agency sufficient time to provide a reasonably good translation. If you do not, you may receive a bad translation, for which you cannot blame the agency.

Complaints are always a delicate matter. Be sure of your facts. If possible, ask a third party to check the translation. If not, and particularly when you are not sure of your facts, query politely rather than accuse. Most people are sensitive to criticism, even when it is justified, and appreciate it if a complaint is tactfully worded.

Personally, I have had only three occasions for serious complaints involving two agencies and one freelance translator in six years. In each case, I had to stop using the translator and agencies. I would now advise anyone to choose a more elegant solution: unless the sum involved is large or your company has suffered serious damage, be silent and pay, but never return for more!

The need to assess the user's exact requirements and to secure a feedback

This is the corner-stone to success, without which you cannot use your resources judiciously and economically, or improve the quality of your service. Find out exactly what your customer wants and why. Would an abstract or a part translation be sufficient? Can you arrange for the translator to read the document to the user? (Point out the saving in cost and time.) Is he interested in the protocol or the results only? Is the translation for his own use only? Is it to be circulated internally or outside the Company? Will a manuscript be acceptable? Can he arrange typing, checking or editing, if required? Can he provide background material?

In addition, you may want to discuss the choice of a suitable translator with your customer. Can he suggest someone you could approach? Would it be useful if they met to discuss the document? You will, at this stage, try to persuade the user to allow the translator enough time to execute his task, and you may, as a last resort, have to tell him that he must wait if the demand for translations or the services of a suitable translator is heavy. All this requires a tactful but firm approach.

It is nearly always difficult to obtain a feedback, and yet it is essential, particularly when you need to assess the performance of a new translator or agency. Mention it when the translation is requested, remind the user when you give him the translation and, ten days or so later, contact him if he has not been in touch with you. If you get a response from 50% of your customers, you will have done well.

Simple house-keeping and costing

Office equipment and routines can be kept to a minimum. You will have to keep an *index of translators* for which cards are more suitable than a book with a thumb-index. The main index will consist of translator cards giving the usual details: name, address and telephone number, qualifications, occupation, language (which ones and at what level), subjects (at what level) and other details: can type, use a dictating machine. You will also record on the card the fee per 1,000 words, of which more later, and make on it any notes as and when required: good but slow, check the number of words, use only *in extremis*, etc. These cards will be supplemented by a subject-language and language-subject index in one sequence. Next, you will need a *translations accession book and progress record* on which you will enter translations in accession number order and record the progress of each translation.

When the translation has been booked and given an accession number, the number is written on the original and on the request, which is filed separately. The translation is then known by its number, which should always be quoted. Photocopies of tables, figures and reference lists should be provided to the translator with instructions that these may be cut and pasted on to the translation. When a translation is done outside your company, you should keep a copy of the original in your office and encourage the translator to contact you if he has any difficulties. When sending work to a translator on your panel, you should include an invoice form of suitable design on which the translation number and fee per 1,000 words is clearly stated. You may even state the number of words. In the case of agencies and outside translators, you are entitled to ask for a written estimate before you place a firm order. If you telephone, specify that you are only making an enquiry at this stage. Once a time and fee have been agreed, these should be confirmed in writing. If you have to cancel an order, you should telephone immediately and confirm the call in writing, and you must not be surprised if you are asked to pay a cancellation fee, or even the cost of the full translation. It is when you order a translation that you should discuss special requirements (double spacing, American spelling, etc.), again to be confirmed in writing when you post the text to the translator or agency.

In the case of 'in-house' translators, you may provide stationery, even a typewriter, and refund small expenses out of petty cash. This is a matter for individual decision.

When you receive the translation, check the invoice, enter it in your accession book and progress record, sign it and pass it on to your accounts department. You may want to keep a copy. Whether the translator or agency is known to you or not, it is advisable to do at least a quick check of the translation before sending it to the user. If the translation is edited before being issued, you should send photocopies of the original and translation to the reviser. This should be recorded in your book, in which you will also enter editors' fees; you may have a separate file for revisers, similar to that described for translators. You may, or may not, undertake the typing of manuscript translations or correct typescripts provided by translators and agencies. If so, access to a word processor will save time and do wonders for your temper.

I keep a box file marked 'Translations pending' in which I store photocopies of translations at various stages of completion in individual plastic folders in accession number order. Each folder contains a sheet of paper on which I record in pencil the actual stage reached (photocopy, retyping, being revised by Dr. Jones), and the date, as I do in my progress book. When the translation has been issued and indexed (author and subject, on cards), these photocopies are destroyed. I find the system efficient and very simple to run.

When the translation has been issued, the request is transferred to a 'Translations issued' ring-binder. The date of issue is first written on the order which is attached to my copy of the invoice to the user, if any. The filing of translations should be selective. Translations of commercial letters and telex messages should be kept only long enough to sort out queries. Those of documents of limited interest may be kept by their users, who should be told that their safe-keeping is their responsibility. Others will be filed for several years, or permanently, in your department. Translations of published articles may be deposited with the reprint collection, internal documents in a central translation file. Each translation and its original is best kept in a plastic folder and filed vertically in accession number order in a filing cabinet. In due course, you may transfer the older translations to filing boxes, discard the originals and dispose of the more ephemeral material.

Each filing system requires an index. In my case, author and subject cards are required. These include the accession number and such details as unpublished, confidential, unchecked draft, part translation, not to be released outside the Company, in addition to the usual bibliographical information. You may want to send details of suitable translations to the Aslib Translations Department. If the translation is stored on a floppy disc, the identifying or locating number is shown on the cards.

Regarding costs, I can only say a few words and my remarks must remain general. Costs may be kept down by asking staff, at least the more junior members, to have their translation requisitions approved by their managers. They may be borne by your deparment and by the user.

Obviously, this has to be agreed initially, particularly if you charge users only when the cost exceeds a certain figure. It will be simpler, if, at the start of your venture, you need not take account of your own time and overheads, but you will have to provide for the payment of fees from the beginning. Many agencies charge up to £35.00–40.00 per 1,000 words for translations from French, Italian, Spanish or German into English, considerably more for translations from other languages or into a foreign language, and impose a surchage of up to 50% for very urgent work carried out outside normal working hours or overnight. Of necessity, agencies are more expensive than professional freelance translators. They subcontract to freelances and the client pays the freelance rate plus a surcharge. As a very rough guide, I would suggest that 'in-house' translators should be paid about 2/3 of the professional freelance rate for the more common European languages, depending on their skill. I have found it useful to offer a slightly lower fee initially and to raise it later on, if the translator's work is consistently good.

Editors and revisers are paid a fee agreed beforehand. This is based on the assumption that an experienced editor will process 1,000 words of a text written in reasonably good English and of average difficulty in 30 minutes. This fee should not be less than £3.50 per 1,000 words/30 minutes and can, in exceptional cases, be as high as £5.00. It may be useful to ask editors to keep a note of the time which they devote to individual jobs in order to adjust your fee, but remember that some editors work slowly, and make an allowance accordingly.

Bottle-necks, conflicting priorities and deadlines

These are part of a vicious circle. To some extent, they indicate that you have succeeded and are filling a much wanted need. If you cannot sort them out, some customers may stay away. The only way to cope is to discuss the problem with all the parties concerned and their managers if need be, see where you can save time (your knowledge of exact requirements will help), and generally be tactful but very firm, which is not always easy. Keeping a note of difficulties regarding priorities and deadlines is useful, as the information can be quoted if you want to extend your service and perhaps justify the creation of a new post and appoint a translator, part or full-time.

Conclusion

I hope that this exposé will encourage you to set up your own translation service. I think that a useful limited level of assistance can be provided at low cost. To a large extent the key to success is to know your limitations and when you should enlist the help of professional translators. If your venture is successful, and you cannot cope with the demand in terms of number of words or standard of translation, you will, sooner or later, have to decide whether you need a fully staffed translations unit for which you will require staff, office accommodation and equipment, not to mention an allocation of funds.

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TEACH YOURSELF BOOKS.

The machine aided translator

Barbara Snell

Rank Xerox Limited

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How can a translator's valuable time be saved by the use of electronic equipment? Modern aids—primarily word processors but also telecopiers, dictation equipment and optical character readers are examined. The translation process is broken down with examples, to establish which components can benefit from equipment available at moderate cost. Production time for supported and solitary translators is compared to establish possible time saving areas. Manual tasks undertaken by translator or secretary gain most from mechanisation but information search is also an important area for savings.

The translator

THERE IS A PAPER in this issue about translation on a budget. I hope you don't imagine that by implication a machine aided translator is an expensive translator. Or, should we say, expensive as translators go, for they are undeniably expensive, but who isn't? Who knows of a cheap plumber, gardener or electrician; to say nothing of a cheap architect, solicitor or private doctor?

Despite advertisements encouraging people to learn languages in 24 hours, without tears, or by any other magic formula, I do not believe that there are any short cuts to acquiring a good knowledge of a language, and the years of education, training and experience that go into producing a translator are equal to those required by the traditional 'professions'.

It cannot be said too often that a translator not only needs to know the foreign language, he must have an excellent command of his own. His work should read like that of a good technical writer—an expert in his field. The third area of expertise required of a translator is his special subject and by whatever combination of study or experience he has obtained his knowledge, it will have been no less of a long, hard slog than that of any other professional expert, which makes him, 'an expensive person'.

A translator may be a self-employed freelance or he may be employed by a company, government department or other organisation. People often imagine that staff translators only work in narrow fields. That may sometimes be true, but I suggest that more often it is not. In fact, freelances are likely to have a narrow speciality while staff translators frequently have to tackle just about everything that lands on their desk; admittedly they have the advantage of access to specialist colleagues, often on the premises.

Unlike the purely oral activity of interpreting, there is also an element of manual dexterity required in producing translations. A translator should therefore, combine both physical and mental skills, (Fig. 1). I shall not suggest improvements to, or

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replacement of, translator's thought processes and will leave others to talk of brain transplants or machine translation, these are not my themes. I should like to concentrate on what we can do to improve and facilitate the manual task of getting the text to the user as efficiently as possible. This is where I see machines aiding translators.

MENTAL SKILLS	1. FIRST LANGUAGE (language of habitual use)
	2. FOREIGN LANGUAGE
	3. SUBJECT KNOWLEDGE
PHYSICAL SKILLS	1. HANDWRITING
	2. TYPING
	3. DICTATION

FIG. 1. *The skills of a translator*

The translator's tools

There is nothing new about translators using machines and other aids: Let us assume that we already have a typewriter, electric in preference to manual—carbon ribbon looks better than fabric—a self-correcting ribbon is a great improvement on Tipp-Ex; cut and paste combined with photocopying machines can save retyping and Snopake is a boon; telex is convenient for transmitting written messages and the telephone for oral communication; dictionaries and other forms of reference are essential for providing information; filing cabinets contain carbon or photo copies of our past history and finally—the friend we love to hate—the GPO provides our postal services. But all these can be largely superseded by one piece of equipment: the word processor.

As I see it, the whole point or advantage of a translator's aid is to do just what the name implies, i.e. help him. Help him to realise his full ability and potential, help him to make the most of his time and skills. We will discount those who translate for fun and concern ourselves with translators engaged in earning their living and providing a service.

Some jobs are best performed by handwriting: marginal notes, jottings and quick translations scribbled on drawings, etc., so long as the writing is not indecipherable, replacing one form of obscurity by another. Quickly typed translations alongside the original, in red for clarity, may be perfectly adequate on telexes, memos and short letters, but discounting such items, the bulk of our work usually consists of long and substantial texts when the physical production of the job may take as long as the actual translation process, i.e. half the translator's time is taken up with the relatively unskilled manual job of producing the work. This is where machines can help, so let us take a look at some of the electronic equipment currently available to translators, by which I mean, within the price range of a normal office or freelance budget.

Word processors

The term 'Word processor' covers machines ranging from little more than electronic typewriters which might retail for £1,000, to large computerised text handling systems costing £100,000 or more. Some are combined with mini-computers while mini-computers themselves, usually possess a text processing capability. Basically they all have facilities for entering, storing, retrieving, editing and printing text.

Input is via a conventional keyboard with a number of additional keys. Stored memory might be just a few lines, in the machine itself, which makes a laborious job of editing and revision; or it could be virtually limitless in the form of hard discs; but floppy discs which lie between these extremes are the most commonly used form of storage. On the simplest machines the only display is the paper output; and while useful for standard letters and so on, this equipment is limited in its use for translation.

A word processor with a thin window display showing one line of text, is the next step up the ladder. It will cost around £3,000 and can be immensely useful. You can correct typing slips immediately by backspacing and overtyping, they thus never appear in the text and you can also have painless second thoughts regarding the phrasing of the last line of your translation.

But once you have used a screen display I suspect you will never want to return to the limitations of a line display machine, although this increased facility will add another thousand pounds or two to the purchase price. Screens usually consist either of a 24 line half page or a full 66 line A4 page. You pay less, but not half, for a half page display—the price might be reduced by about a quarter, which is quite a consideration; and for translation purposes, where layout is not vital, I would say the saving is worth while.

A word processor with a visual display unit (VDU) no longer resembles a typewriter, it has turned into a very different animal which will involve certain changes in your office layout. The machines we have referred to so far have consisted of what looks like a typewriter and a box containing the 'brains', called the central processing unit (CPU); but you now type on a slim keyboard which, according to the latest recommendations, should be no higher than 30mm (1½"), so you work almost on a level with your desk; your output appears on the VDU, like a small TV screen but with better resolution and we trust, no flicker.

In all current word processors you can place the screen where you like in relation to the keyboard. I do not like the VDU in front of me as I prefer not to look while I am typing, but this is a matter of choice. These two items comprise your work station. The other two units may be solely for your use if you have a 'stand alone machine', while if you use a 'shared resource system' the CPU and the printer could be shared with as many as 30 other operators. If these are in another room your work station will take up very little space. The printer itself is the size of a typewriter and is certainly no quieter, but the keyboard is silent except for a slight clicking. Noisy printing time is short and there is no need to work near the printer as it can be placed at a distance.

Storage will probably be on floppy discs, one or two sided, either 8″ holding 120 pages of text, or 5″, correspondingly cheaper, with less storage space. For large volume storage, especially using shared resources, hard discs holding many thousands of bytes (units of stored information) will be needed, replacing your filing cabinets and carbon copies.

You will need to develop a system for identifying your discs and the 'documents' they contain, but that is all you need to do, for the discs themselves hold their own record systems. It is a matter of seconds to call up the document you want on the screen and only as many minutes to print it out. Strictly speaking one should not refer to 'documents' as your text does not exist in any tangible form, but I find the familiar concept easier to grasp.

Communicating word processors

A further feature of word processors which should be mentioned is the communications facility. Your machine can be connected either through a computer network or via a modem, currently installed by the GPO, linking you to any other compatible machine; at the present time unfortunately, there are still far too few of those.

Text communication opens wide horizons to translators. Picture the convenience of transmitting documents direct from one typewriter to another in the different locations of multinational companies; from freelances to their clients; between colleagues to ask an opinion of a text, and so on.

The future prospects for networks to which all kinds of electronic equipment can be connected are very far-reaching. Facilities are available for electronic mail and a paperless office. In fact, one wonders whether future generations of office workers will even need to learn to write. But as translators are unlikely to link up their own networks within the next few years we will not look at the implications of these developments.

Other modern aids

I should like to step aside from word processors for a moment to mention some other aids:

Telecopiers

While on the subject of electronic communication, telecopiers are of enormous benefit in transmitting material not written in the Roman alphabet. Word processors have been developed which can handle Arabic and Cyrillic alphabets, and most can accommodate the umlauts, accents, other diacritics and special letters in the Western European languages, although it may mean using a different print wheel. Ink jet printing extends the scope of printed output beyond that of the daisy wheel and there are machines which produce graphic displays.

But there is no avoiding the fact that we sometimes need to copy material such as diagrams and drawings which can only be transmitted by facsimile machines. Models are on the market for around £3,000 which will send a stack of up to thirty originals automatically and receive unattended, like a telex, but without the imponderable element of operators' fingers. You can use a telecopier as an ordinary copier—should you not have one—but it is difficult to imagine an office nowadays without a copying machine. Whether you rent or hire, feed in the originals or have a flat platen will depend on your purse and your requirements, but I will not dwell on copiers and duplicators as these are machines which I assume are familiar to you all.

Dictation equipment

Dictaphones are popular for high volume translators, especially those who have never learned to type efficiently. Few people type well who have not been taught touch typing (men in particular have often not had an opportunity to learn). I find typing with eyes shut or without looking at the text, much more relaxing than looking at the keys. Translators usually favour foot controlled microphones which leave the hands free. Sometimes pilot-type headsets are used to great advantage permitting unfettered access to the bookcase while dictating. It should not be forgotten that if ambiguities are to be avoided a good clear voice is essential for dictation.

Many translators with secretarial support achieve very high output with dictation equipment. Here translating almost approaches the technique of interpretation, where the job is entirely oral. But so long as the translator has the final responsibility for the presentation of his text we must still regard him as requiring physical skills, even though he may delegate them to someone else.

Optical Character Readers

Optical Character Readers (OCR), machines which can read texts and print out or transfer onto a disc, have been in use for some time. I first became aware of their existence from the grotesque figures indicating the account number on cheques. Special golf balls and daisy wheels have been produced for optical character reading but machines have now been developed which can read any typeface, including Arabic and Cyrillic. They are still extremely expensive and are an aid to, or replacement for, the work of secretaries rather than translators.

Machine translation

There are systems of semi-machine translation which replace one language with another with varying degrees of success, leaving the translator to edit the results. Software for this purpose, used in conjunction with various combinations of computers, dictionaries and word processors will, without doubt, play an increasingly prominent role in the translation scene in the future. But the cost of such packages puts them beyond the scope of this talk.

The next logical step would be to examine machine translation itself which threatens to replace, at least in part, the work of the translator, but this topic can hardly be regarded as coming within my brief.

The translation process

Let us take a look at how a translator actually uses a word processor in his work: Fig. 2 shows a German paragraph which I translated recently in the context of a specification for VDUs in offices. For those of you who do not know German, Fig. 3 gives the equivalent English words much as you would find them in a dictionary, with a few minor changes in the word order. Although the words are English they are not a translation of the original as they do not convey the meaning intended by the German writer.

If you did not know much German but you tried translating this text with the help of a dictionary, you would sometimes be faced with difficult choices. What are we going to call 'Arbeitsmittel', literally 'work means'? Which of these words is appropriate for 'Anordnung'? Arbeitsvorlage, as you can see, could mean a number of things. It is often the simplest words that provide the greatest headaches. If you are thoroughly familiar with the subject, the margin of error of your choice is narrower.

Die Abmessungen von Bildschirm-Arbeitstischen müssen den ergonomischen Erfordernissen entsprechen, so dass stark ermüdende oder gesundheitsschädliche Körperhaltungen vermieden werden.

Die Tischflächen müssen eine flexible Anordnung der Arbeitsmittel Bildschirm, Tastatur und Arbeitsvorlage bzw. Vorlagenhalter zulassen.

Bildschirm-Arbeitsplätze, an denen handschriftliche Eintragungen vorgenommen werden oder mit grossformatigen Arbeitsvorlagen umgegangen wird, müssen mit Tischen ausgerüstet sein, deren Platten mindestens 1200 mm breit sind.

FIG. 2. *German paragraph for translation*

The measurements of viewing screen work tables must correspond to the ergonomic requirements so that strongly tiring or harmful to health body positions will be avoided.

The work table areas must allow a flexible arrangment of the work screen, keyboard and work presentations respectively presentation holder.

Screen work places at which handwritten entries will be dealt with or where large format work presentations will be worked with must be equipped with tables whose plates are at least 1200 mm wide.

Anordung—direction, disposal, order arrangement, regulation, instruction
Arbeitsvorlage—not found in dictionary, but
Arbeit—work, and
Vorlage—filing, submission, presentation, pattern, model, original, copy, bill

FIG. 3 *First version of translation*

Having looked at the translation again, played the tape back or let it go through his mind once more, the translator might decide on a second version, necessitating re-recording the tape if it was dictated; crossing out the draft or retyping if the 'final' translation has been typed straight on the machine; or mentally rearranging the text, which involves a high degree of memory and concentration. But however he worked, an experienced translator would soon end up with something like this second attempt in Fig. 4, either in his head, on paper or on tape, depending on his method.

The measurements of viewing screen worktables must correspond to the ergonomic requirements so that body positions which are very tiring or harmful to health will be avoided.

The work table areas must allow a flexible arrangment of the work screen, keyboard and work document and document holder respectrively.

Screen work places at which handwritten entries will be dealt with or where large format work documents will be worked with will be equipped with tables which have surfaces at least 1200 mm wide.

FIG. 4. *Second version of translation*

Take a closer look at this translation: One does not expect a well behaved audience, such as yourselves to heckle or throw tomatoes, but you might justifiably feel indignant, at the standard of work I have served up to you as a model. You could object that it is not normal English: 'Screen work places' sounds odd. The passage is cumbersome and repetitive, it doesn't make much impact even after reading twice. If you voiced your doubts I could ask, 'What's wrong with it?' That is not so easy to pinpoint. I could say of every word, 'It's in the dictionary and "they" should know'. If it is long winded, 'Well, so was the original, that's not my fault, I'm the translator, not the author.'

But we have said that we expect a translator to produce a text which reads like a piece of skilled technical writing written by an expert in his field, at best, if the translator is a specialist; or at worst—if he merely has a good technical background—slight allowance can be made. If the document is to be printed in the form of publicity or prestige material it will in any case, be edited by a specialist expert. The editor should have no doubt as to the meaning of anything in the translation and as a non-linguist he will not be able to refer to the original foreign text so the entire meaning must have been conveyed fully by the translation.

Having completed the text the translator may realise that where he used 'document holder' in Chapter I, in Chapter 5 it is clear that the object, should be called a 'stand'. I used 'work place' but later found I needed to refer to 'place of work' as it fitted better, so decided to call 'Arbeitsplatz' a 'work station'. A number of words in the passage are unnecessary. The whole paragraph needs rewriting. There is a typing error and a spelling mistake; some sentences are long and ambiguous. I could do one of several things:

(a) leave it as it is—after all it conveys information;
(b) change the worst points and some of the words with Snopake;
(c) retype certain pages;
(d) edit the whole job and send the text back for retyping or retype it myself.

This latter procedure is absolutely essential for a good quality translation.

Many people claim to do a once only job—I do for much of my work. But I do not pretend that the result is anything but a draft. Without rewriting it will be not a piece of good English, though it often has to do duty as such.

To avoid postures harmful to health or liable to cause excessive fatigue, dimensions of VDU desks must conform to ergonomic requirements.

Desk tops must allow versatile layout of screen, keyboard and documents or document stand. VDU work stations must have desk tops at least 1,200 mm wide if they are intended to be used for handwritten entries or large format documents.

FIG. 5. *Final version of translation*

In Fig. 5 we have a final version which I hope you find conveys the meaning more readily than the last effort, and that is what it is all about.

The time factor

How does our expensive animal, the translator spend his time at work? The chart in Fig. 6 shows the stages which are likely to be involved in the manual production of a translation whether handwritten, typed or dictated. This is an important area where electronic machines can save valuable translator time.

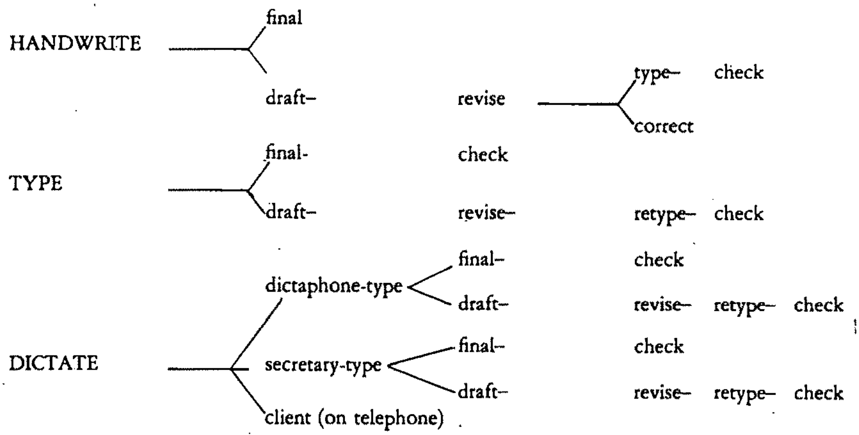

FIG. 6. *Production of a translation*

Another area is in obtaining background information: We will say the subject is new and the translator needs to read up on the subject. We can continue with the text

I translated recently on 'Measures to prevent eyestrain from the use of VDU's': No one should have to turn down a job like this because he is not an expert in the subject. It is a new field and any translator with a reasonable amount of experience should be able to tackle it.

Our library provided me with a Health and Safety Executive paper, a booklet produced by the Association of Optical Practitioners, a leaflet from one of the trade unions and an article from a journal. Depending on the level of support he enjoys, a translator might have the important or relevant passages and useful vocabulary items highlighted for him, saving a great deal of time, as background reading and searching for terms can be very time-consuming.

An extreme example was my quest for optical terms in connection with this job. Medical translator colleagues had no experience of texts on eyes and the local optician was no help either. Extended research by our German office did not produce the English terms, they ultimately gave me the name of a Harley Street specialist whom I hesitated to contact. After several phone calls to Moorfields eye hospital I found most of my answers and they put me in touch with a professor of ophthalmology who sorted out the last query. But it had been a long process, expensive of many peoples' time besides my own. Online access to an appropriate reference would have been worth a great deal on that occasion. A freelance translator recently stated that 10% of his total time and 5% of his total income was spent on obtaining and filing reference material and it could easily be more with the increasing proliferation of material.

The clock charts in Fig. 7. give us an idea of how a translator might use his day. We compare a lone translator and a highly supported translator. You might well have a supported freelance and a lone staff translator or vice versa.

The translator receives the job at 12 on our clock.

Having obtained the necessary information, or had the subject researched, the translator reads the text through, studies it, and starts or continues a glossary (which is added to throughout the job). The time spent on this stage will clearly vary enormously, depending on the familiarity of the translator with his subject.

Work on the text starts with initial typing, dictating or drafting; this includes dictionary look-up and glossary compilation; the time required clearly also varies. This is the translator's production time and is often only 50% of the total working day of an unsupported translator, though it should clearly be more if assistance is available.

Revision is the next stage and it involves reading through, revising, checking and correcting the draft; this may take longer for those checking a typist's work, depending on the typist! More checking time is probably required if translation has been dictated.

This is followed by retyping or correcting.

Finally the checking stage, which will need to be more thorough for retyped translations as new errors may have been made.

The chart also shows us the same job done by a translator, with or without a secretary but with a word processor.

Assuming that online search and information retrieval is available we can considerably reduce the time required to obtain information and terminology, especially if the secretary builds up glossaries from words indicated by the translator.

Typing time is less than before, due to the ease of correcting slips—especially valuable for a less expert typist which the translator is likely to be.

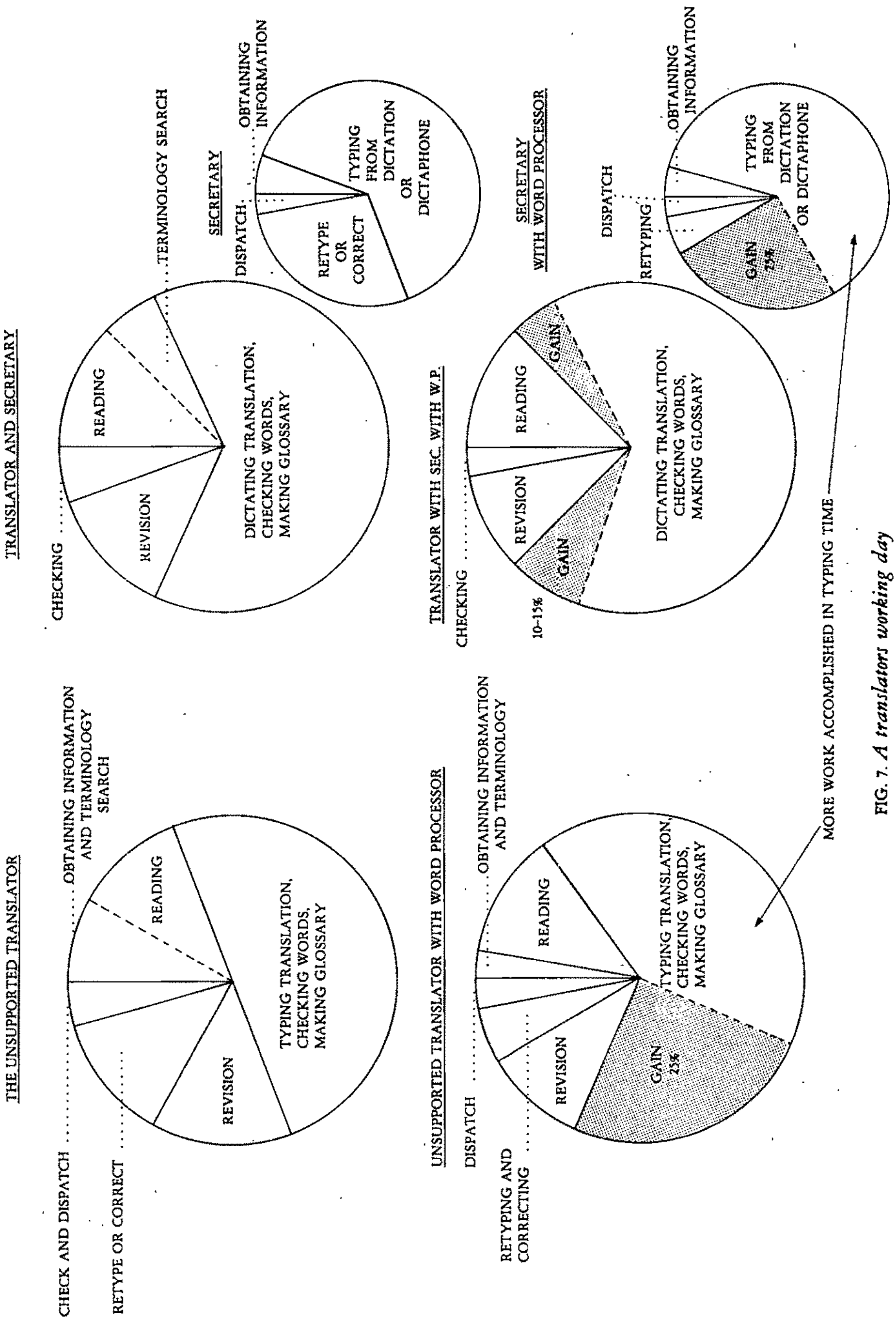

FIG. 7. *A translators working day*

Revision time is the same if we are working from a paper printout of the text. I do not like undertaking lengthy revision on the screen, although this is perfectly possible and would clearly be quicker.

Retyping and/or correcting is where we gain the most time but final checking is also quicker for only revised material and previous errors will have been retyped. Revision marks can be inserted on a draft printout indicating where changes have been made in the text.

Freelance and secretary time is required for dispatch, logging, invoicing, addressing envelopes, etc.—the latter job will not be done by a WP, the typewriter is still needed for some things.

The cheese charts indicate a 25% time saving for the unsupported translator and secretary while the supported translator himself might save at least half that, in addition to the gain in secretarial time. Using a secretary saves more expensive translator time, but due to high overheads and the cost of employment the current trend is to not support expensive people with cheaper assistants but to reduce the employee numbers. Actual figures must clearly vary greatly but I would be surprised if a saving of at least this order could not easily be made with a word processor after the initial training weeks.

What a word processor can do

Those of you who are familiar with word processors will not need reminding of the useful features they offer but for those to whom this type of equipment is new I will just mention a few of what may appear fairly obvious facilities:

Presentation of typed text is always immaculate; your documents are invariably of camera-ready print quality with the facility for right hand margin justification. The more you pay for a printer the better the appearance of your finished work.

Headings can be centered at the touch of a key. Type faces are governed by the daisy wheel which can easily be changed, although one does not want to have to do this too often in any one text. The layout can be altered in a flash; you can do your draft with double spacing and then single space for the final text. Block spaces can be left in the text for diagrams and comments such as instructions to the typist can come up on the screen but not print out.

Easy revision means that you can change your mind as often as you wish, but resist the temptation to keep revising just because it is easy, or you will lose the time saved by the word processor.

Indexes and glossaries

Indexes are likely to be of particular interest to librarians, while translators are probably more concerned with the compilation of glossaries and rapid reference to them.

This is an area of great scope for future progress. Any translator of more than a few years' experience will have acquired a collection of terms, glossary lists and useful translations relating to specific fields of activity. Organizing and retrieving this information becomes increasingly difficult as the lists grow and we all look forward to the development of new methods of sorting, storing and accessing our glossaries.

The average word processor will not file terms alphabetically but when the vocabulary is printed out it is not difficult to decide where a word should fit. Tell the machine to 'search forward' to the next word and simply type in the item in its place. A word list can be compiled for each job as you go along, modified as required, with a copy filed for future reference with the translation. All the individual word lists can go onto a master glossary disc which becomes the translator's personal dictionary, updated and printed out whenever required.

Online

As you are well aware, we can now go online to hundreds if not thousands of sources of information all over the world, and I need not stress to you information specialists what fields will be opened up when more information is available to more people. At present the boundaries between Prestel, Ceefax and Oracle-type screen based information and word processor VDUs are clear-cut: TV screens are in the home and VDUs in offices. We can only hope these distinctions will soon disappear.

You are doubtless more aware of the pros and cons of online information search and retrieval than I, so I will not dwell on this topic other than relating the cost to translator time. The relevant costs are the purchase of equipment; telecommunication time, which depending on the network or system used, can vary from £5 to £50 an hour; naturally the longer the distance the more you pay. Access charges to hosts are even more difficult to quote, as is the price of hard copy output, should you require it. But the value of interactive interrogation of such bodies as the International Atomic Energy Agency can only be assessed by the individual in question.

Term banks

Translators dream of a data bank available at their elbows, to which they can turn in the knowledge that they will find what they are looking for, including definitions and examples of use, plus foreign language equivalents. If a term bank is interactive and the required word is not found, the bank should make a note of it, ask for details of where found and rapidly come back with a suggestion, if not an authoritative answer. The term can then be entered provisionally and further requests for the same term will help to clarify its usage. In due course it will cease to be a provisional term and will become standard.

If everyone referred to the same bank we would avoid the proliferation of misunderstandings and shifts in meanings of new coinages. EURODICAUTOM has made a start in this direction but there is still a long way to go before one can obtain the information one wants and no more. The term bank will have to be vast if it is to contain all the words that we will need, but computing and storage costs are falling, in real as well as in relative terms. Such a bank will be with us one day if only we can agree on the input. It is a sad reflection on the human race that man has the wits to invent such a marvel but lacks the ability to cooperate with his fellows on its use.

The customer

We are at a very exciting moment in the development of text handling equipment. Every day is market day, everyone is rushing to proclaim the special features and advantages of their machines. But 'caveat emptor': discs are not interchangeable, one system will not talk to another; if you have learned to use one model you will not be able just to sit down and immediately use a machine made by another company. Many models will be squeezed out of the race; it is up to the consumers to make sure that the best ones survive.

In the future we shall doubtless find more compatibility and less diversification in equipment, not I fear, from a desire on the part of the manufacturers to be helpful but from consumer pressure. You, the customers must use that pressure wisely, think and try before you buy. Make sure you are getting the very best equipment available for your particular purpose even if it means spending twice as long studying the market as you thought you would need to. I have said in the past and I say it again: If you regard the purchase of a word processor in the same way as you would regard a car, you will not be far out. The cost will be comparable, but from the point of view of financial benefits, the word processor wins all along the line.

Monitoring the demand for the services of academic libraries—the survey as a library management tool for capital services

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Introduction

A decision on the allocation of seating space within an academic library requires information on the complex pattern of behaviour of library users in relation to the services of that library. In a period of particularly stringent limitation on library funding, especially on the capital account, it might be argued that the constrained space within an existing library should be even more effectively managed than in the past. This would seem to justify a correspondingly more intense process of monitoring of the use and potential use of library services by library managers. The information obtained should be relevant to decision taking in that it is appropriate and immediate but at the same time as inexpensive as to justify its gathering.

The present article is concerned with examining issues in the monitoring and control of seat use for study purposes. It reports briefly on an experimental monitoring system which adopts a rotating sample survey design to obtain information on this important attribute of library consumer behaviour, which with a high degree of initial organization has been found capable of being usefully implemented by library staff with little survey training. Equally important the survey produces a good response from consumers, is swift in implementation and causes little disruption of ongoing library activity. For analysis, it uses the widely available S.P.S.S. survey package and can be relatively flexibly adapted to a variety of circumstances. A utilization index is suggested as one appropriate measure of consumer use for analytical purposes and some illustrative results presented.

A review of the literature

The literature on 'user studies' is vast, unco-ordinated and concentrates on those elements which can be most easily measured. The monumental recent work by Machlup[1] *et al.* concentrates its attention on shelf counts, bookfunds, type and quality of holdings and finds American libraries, at any rate, were unable to provide even basic data such as 'all book titles by subject' and 'serial titles by subject', 'book titles by year of publication with times checked out since acquisition'.[1] The analogy with the grocery store has some validity in that libraries should improve their stocktaking and turnover recording but it is necessary to point out that Machlup has over-simplified the operation of the academic library in his study of the dissemination of information. A similar lacuna appears in Baumol and Marcus's study[2] of 23 private and 35 public university libraries which regressed some 15 variables including total expenditure, book expenditure, total staff, professional staff, numbers of volumes added per student and salaries and wages. It was easy to calculate from such data the

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incremental cost of adding each new volume. Such variables will enable one to obtain costs but not values, which are much more difficult to assess.

The study of MIT by Raffel and Shishko[3] was more sophisticated in its attempts to quantify the value of library services to users but required considerable awareness on the part of readers of library services. It is not a method which can be applied simply to a less well-endowed institution. Hamburg[4] introduces the concept of 'exposure time' evaluating the 'output' of a library by matching exposure time (in item-use days) with the costs of facilities, equipment, resources, staff and services necessary to produce exposure, with an element allowing for asset depreciation. The resulting equation is complex, perforce, recognizing the complexity of factors governing library use. However elaborate the costings Hamburg develops, it is difficult to establish firstly what document exposure is, secondly the most efficient method of exposure, and thirdly other elements of library use which must be accounted as benefits and costed as such, but which can only be indirectly linked to document exposure. Hamburg recognizes that increasing document exposure means increasing the level of service and the costs of control, and indeed one of the elements of his costing is the cost of user area per capita[5] but the definition of his population (library users or potential users, for example) is not clear.

Another theoretical approach to the problem is the Markov model introduced by Morse[6] who calculates that queues are predictable and can be solved by a formula of limiting loan periods and raising the number of copies of books available. Like Buckland and the Lancaster researchers,[7] Morse applies queuing theory only to measured circulation. For aspects of library use less easily quantified one must look at studies by Sommer whose work at University of California, Davis,[8,9] confirms findings at Amherst, Dartmouth and Michigan that a vast majority of students in three reading rooms used their own materials; a small majority sat in pairs, but the rest were sociofugal and preferred to be as far from the other readers as possible. This implies that the library is valued as a quiet place of study and as a social centre, and that the provision of seating is an important factor in the net balance between costs and benefits. This approach has been generally ignored in the literature though an important descriptive survey was undertaken by the University of Cambridge Library Management Research Unit published in 1975.[10] The aim was to find out how libraries are used and to attempt to predict peak demand. The results seemed to show very varied factors influencing seat use between institutions and the present survey was heavily influenced by the LMRU work in its concentration on relating seat use with place, type of residence and subject of study in particular. What is not brought out by the LMRU but is emphasized by Kleiman and L'vov[11] is the economic effect of seating congestion—apparently no problem for the 11 institutions LMRU studied—and new methods of assessment taking into account the cost in queuing for a seat, the cost of reading rooms and seating and staffing costs. Kleiman and L'vov's equations are theoretical; a practical system requires indicators which are easily and cheaply obtained and which can be related to other relevant statistics to demonstrate the factors which govern demand for library services and to predict movements which have implications for library planning. A spatial methodology developed by Hall[12] is essentially an analysis of flows which though valuable is a separate aspect of library costing. A study of student user opinion by Moss and Green[13] suffers from the methodological disadvantages of opinion rather than observed phenomena.

The supply and monitoring of library services

Within the fixed constraints of an existing library building the supply of library services might be usefully categorized into fixed (or capital) and current services. The utility of this distinction for the purposes of the present paper is that it often reflects the degree of monitoring or potential monitoring by library management. Broadly, the degree of monitoring would seem to go down with the translation from current to capital items. This probable bias would be understandable on the part of those library staff whose predominant activity is linked to the current service items, but has little rational justification, neither in the light of the interdependencies between capital consumption and current service items, to be explored below, nor within the context of overall long-term resource management.

Examining the major services that the library provides, we come first to the cataloguing and the servicing of the loan stock exchange with users. These are clearly the main traditional current service activities pursued by library staff but they are ones that have displayed, and with the advent of micro-processor substitution will surely continue to display, declining inputs of staff time per transaction. Since staff control is involved they are usually well monitored. Book management, such as the shelving of returned stock, and the manipulation of existing stock, provides a second area of current service activity, which will likely be subject to some technological changes as a consequence of microprocessor applications.

Periodical and new book management is a service function associated with the capital item of net investment in stock. The purchase of these capital items is usually well monitored for obvious reasons of budgetary control but the services of these capital items (especially if they are for reference purposes) are not usually as well monitored. In fact, the lack of monitoring with respect to periodical use by consumers is probably a reflection of policy issues (no academic library can be or be seen to be without those recognized periodical sets of particular disciplines within the institution).

The space dimension of library services supply is a critical one and clearly many aspects of innovatory change are associated with space saving in the storage of information just as much as in the effective recovery of information from store. Microfiche and video recorded film are just two examples that illustrate this process whereby the productivity of library staff as well as the space requirements of storage improve contiguously (although clearly the generating demand for the second innovation has not come solely, if at all, from within the library service consumers).

One of the most important capital services provided by academic libraries that is space intensive (or perhaps it would be better to call it space extensive?) is that of seating accommodation for study purposes. This is widely recognized as an integral element in an academic library but is not as readily monitored as loan stock use. Yet it is probably the most expensive service to provide for the consumers of library services and the least liable to any space saving technical innovation (except in so far as one can envisage consumers operating on library services from distant computer terminals. Perhaps for certain types of material this is not too futuristic a prospect). Study seating services are clearly in joint supply with other services in the library, and, for that matter, in joint demand with other services as well. (As will be shown later, a critical piece of information for managing the provision of services is the degree of joint demand by consumers for this and other services.) In fact, we can say there is a joint supply situation with respect to all library services wherein that joint supply is a complicated function of existing built structures, traditional practices, utilization rates (seating accommodation has the characteristics of an impure public good; see for example Pearce, D. W. and Nash, C. A. *The social appraisal of projects*. London: Macmillan, 1981. Chapter 8), and technical and other innovatory change.

The demand for study seating as an attribute of the demand for library services

As has been referred to already, the demand for study seating is interdependent with that for other library services. There are clearly attributes of joint demand—to take a simple example, the provision of short period loan facilities for heavily used documents or books will be subject to varying utilization rates depending on the provision of study seats for users of the material, in this case the utilization of seats mutually associating with the utilization of loan stock.[14] To take a contrary example, a library subject to congestion may make library stock more accessible for extended loan. In this case there is the possibility of substitution by the consumer of one library service, namely loan services, involving a current cost, for another, namely study seat provision, involving primarily a capital cost (there may also be some current costs involved if library staff are required to service the seating, for example collecting books and removing papers of absent consumers). This last example illustrates the plausible contention that congestion may have a critical effect on observed behaviour in a library.

The force of the above examples is to illustrate that in examining the arguments for a demand function for a particular library service it is necessary to place some emphasis on the provision and utilization rates of other services. For library management purposes consequently it is necessary to have a complete model of the behaviour of consumers within the library that takes account of these interdependencies.[15] To identify and predict that behaviour on the basis of partial information and in a way that ignores these interdependencies is theoretically dubious and is liable to be misleading. Such a model would more adequately allow for an examination of the impact of changes in policy, instrumental, and other (non-controllable) variables.

If one concentrates on the demand for seating then in addition to the interdependencies noted, related to the provision of alternative and complementary services, one can usefully identify a number of extraneous factors.[10] The first set relates to the characteristics of the consumer, the second to the characteristics of the seating, and the third to the characteristics of the occasion.

The exchange situation

The observed behaviour of consumers in a library is clearly a response to the constrained choice situation presented to them, where although there is no explicit market 'price' for them to react to, there are yet clearly shadow prices that reflect costs to them in the alternative use of the services, and which will modify their consumption behaviour. The task for a library manager wishing to assess the impact of changes in extraneous variables is consequently to monitor and analyze the exchange situation. There are clearly exchange situations where the service is readily monitored. One of the obvious is the book loan service which, certainly with short loan material and external loan services, provides a most valuable indicator of current consumption. Moreover, with the widespread adoption of computerized loan systems it would be increasingly feasible to monitor important attributes of this service, turnover and queuing rates for specific loan stock, for example.

However, it is clear, as argued before, that this is only a part, if a most important part, of the services supplied by the library. It reflects primarily the active running costs of information exchange between consumers and library staff and can be misleading as a general indicator of the use of the whole range of library services, especially those capital services that are space using. To use an example, already mentioned, a consumer suffering congestion because of competition from other users may well substitute the monitored service of 'bookloan' for the non-monitored service of 'seat use'. Clearly a system response to congestion due to an inadequate seating provision may produce the same monitored effect as an autonomously induced increase in the use of book loan services. It is conceivable at the extreme that the information from the monitored exchange may indicate an increase in library service utilization which masks an overall reduction in library utilization due to constraints on capital provision. So that by looking at partial information on the system of interdependencies, quite misleading analyses for projection and policy purposes may be obtained. In short, an effective management control requires a monitoring of all consumption activities within the library, the elucidation of a full behavioural model of the activities taking place in the exchange situation and the relating of this model to the constraints and instruments available for optimal control of that behaviour in the light of policy considerations and extraneous change.

The survey as a library management tool

For quick, unobtrusive and reasonably continuous monitoring, the survey is clearly the major tool that recommends itself to library managers for non-monitored exchange situations such as study space utilization. Clearly all the usual safeguards should be implemented to ensure an unbiased and reliable estimate of the various parameters of the distribution of service utilization within the library—this will usually be at best some form of stratified random design so that sampling errors can be reliably estimated. Correspondingly the remit of library managers is to implement a survey methodology capable of speedy implementation and analysis and relevant to decisions on location and provision of such as seating, books, reading rooms and loan facilities, as well as the broader policy decisions made for the institution as a whole.

The experimental monitoring survey implemented by the authors concentrated on seat utilization with the specific decision framework in mind of, firstly, how much space should be allocated for study places with respect to book space—as study seat space invaders—and secondly the linked question of how library specific were the purposes pursued by users, perhaps within the context of reading room provision, for example.

The choice of sampling frame for examining seating use is based on a balancing of a number of factors and must be made with some awareness of possible interdependencies. One sampling frame was the seats themselves—with the problem that one will be biassing the survey towards the relatively 'static' and high frequency or long duration users of the library seats. This may be perfectly acceptable for certain types of decisions, but not for others.

A survey of users within the library based upon some form of spatial grid would provide a better methodology for overall use but would be relatively complex to administer and might generate special types of non-response bias. A survey of library users at entrance and exit points would again perhaps generate some forms of bias, especially non-responsive, and would not readily allow users to provide accurate details on the location of their previous seat use.

The practical experiment

In the weeks beginning 10 March, 19 May and 10 November 1980 and 18 May 1981 10% samples of readers in the Frewen Library, Portsmouth Polytechnic, were given questionnaires at 11.30 a.m. and 2.30 p.m. for five days Monday to Friday covering every seat in the Library. Library staff followed a standard route on each occasion choosing a different seat according to a prearranged formula. Each survey took up to 20 minutes including callbacks and checks. Response rates were good: 459 out of 460, 460 out of 460, 443 out of 448 and 447 out of 448. Empty and reserved seats and refusals were recorded and replacement respondents found.

Simultaneous with the November survey a small survey of 193 second and third year students in the Polytechnic as a whole was made. Ninety three responses (48%) were received after a follow-up exercise. It can be suggested from the reduced library usage of the Polytechnic sample as compared with the in-library sample that the non-respondents are likely to have been lower users of the library.

Principal tables calculated from the data include:

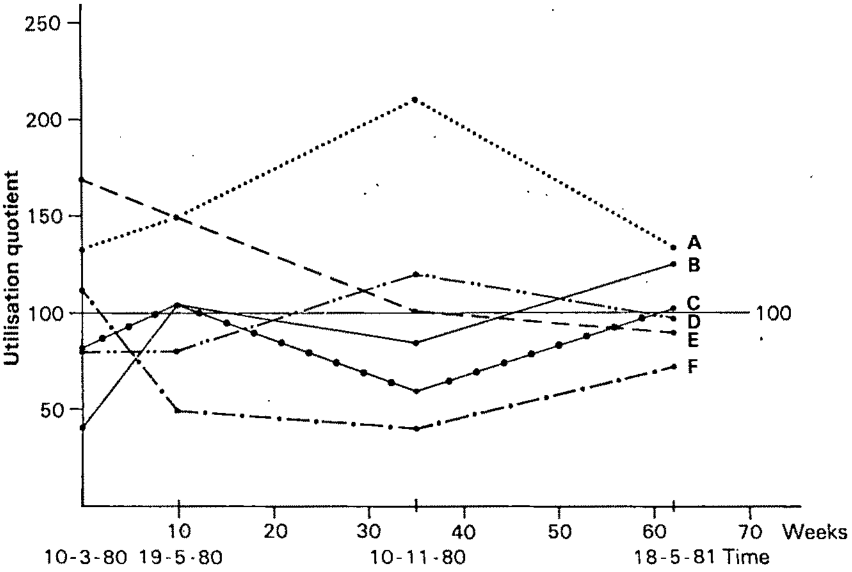
—Seat occupancy by day, morning and afternoon, year on year
—Difficulty in seat-finding, by day, morning and afternoon, year on year
—Ranking of periods in order of difficulty, survey by survey
—Duration of visit by year, for all students, fulltime and sandwich, by faculty
—Duration of visit by department (with standard errors)
—Seat utilization quotient by department by faculty

Once the variables had been defined and the data put into the master file, it proved easy to use the Statistical Package for the Social Sciences to manipulate the date and regress one variable against another. The graphs in the appendix illustrate how seat occupancy by department and by faculty varies against a standard norm over time. Year on year comparison eliminates the seasonal component and suggests considerable variation in demand. Further tables detail distance of residence from the library, purpose of visit and other variables which can possibly affect interdepartmental rivalry for library space at certain times of the year, or week, or day. It would also be possible to analyze the date to obtain details of use of each floor of the Library, or indeed each group of seats, since the same pattern of sampling was followed on each occasion; but the analysis would then have too little data for a reasonable degree of confidence.

Conclusion

The implementation of a reliable survey methodology for regularly assessing the use of expensive capital services in libraries is justified by the complex interrelationships in their provision and use. The empirical evidence on utilization rates of study seating (see Appendices 1–3) and other analyses not reported here, indicate considerable variability in student demand for study places. Within that variability in use, however, are predictable components. These might be used to indicate to library managers the impact of particular policies and of changes in variables outside the managers' specific control. The increasing facility provided by technological aids to the monitoring and control of library services and the ease of implementing a regular survey of expensive, but usually non-monitored, library services justify an increasing emphasis being given to such procedure.

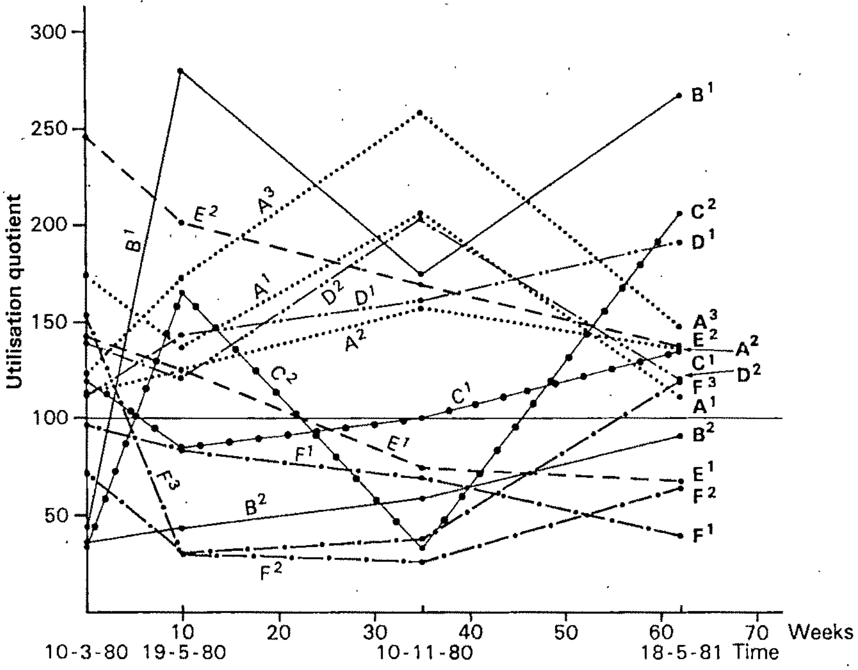
APPENDIX 1. *Utilization by faculty:*



A Economics, Business, Management
B Humanities and Social Science
C Engineering
D Physics and Life Sciences
E Environmental Science
F Maths, Computing, Geology

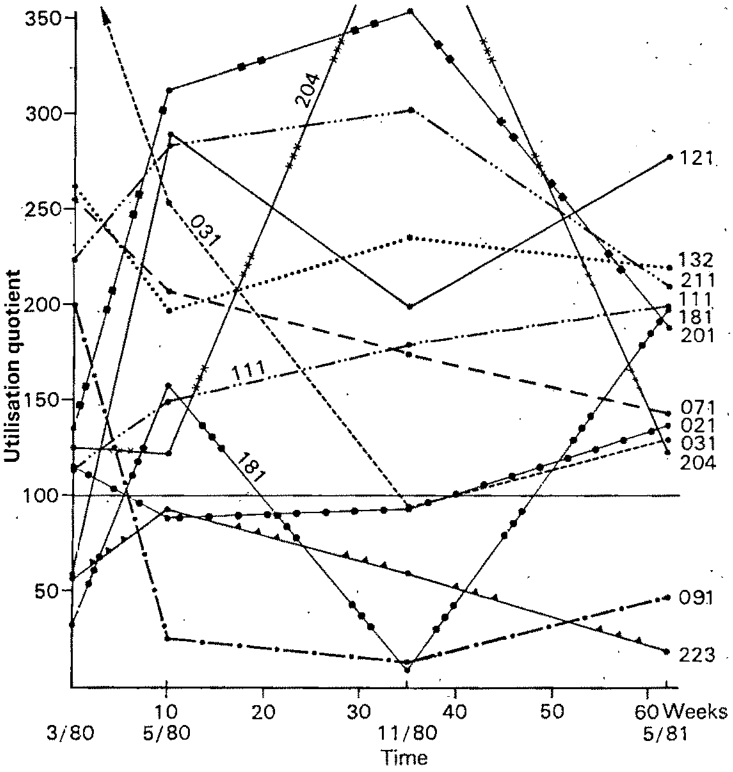
$$\text{Utilization quotient} = \frac{\text{\% of seats utilized by class}}{\text{\% of student population by class}}$$

APPENDIX 2. *Utilization by department:*



A1 Hist & Lit
A2 SLAS
A3 Social Studies
B1 Geology
B2 Computing
C1 Biology
C2 Pharmacy
D1 Geography
D2 Surveying
E1 Business Studies
E2 Economics
F1 Civil Engineering
F2 Electrical Engineering
F3 Mechanical Engineering

APPENDIX 3. *Utilization by course:*



021 Biology BSc
031 Business Studies BA
071 BA Economics
111 BA Geography
121 BSc Geology
132 BA Historical Studies
181 BSc Pharmacy
201 BA Psychology
204 BA Politics
211 BSc Urban Land Administration

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The use of Prestel in libraries on Budget Day

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Institute of Advanced Studies, Manchester Polytechnic

The paper describes a study carried out on Budget Day, 10 March 1981. The behaviour of user groups and the problems encountered in accessing viewdata were observed in four different libraries. Attitudes of library staff to the service were collected and the Budget News presented by various Information Providers (IPs) was analysed.

The findings of the research are discussed. The paper focuses on the changes viewdata has initiated in library organization and in the working practices of librarians, the patterns of user behaviour and the particular ways in which news is structured by different IPs. The role of libraries in promoting viewdata is considered. Variations in methods of presentation by six IPs are discussed.

Introduction

ON BUDGET DAY, 10 March 1981, the use of Prestel and its role in disseminating Budget News was observed in four different libraries: a university library, a central library and two branch libraries. The purpose of the study was to discover how users reacted to Prestel, the problems encountered in doing so and the attitudes of the librarians to the system. The Budget News presented by different Information Providers (IPs) was recorded and briefly analyzed.

Background

The sets had been introduced into the libraries on an experimental basis. They are included in a research programme funded mainly by the British Library Research and Development Department. Terminals had been placed in these particular libraries mainly through the efforts, and enthusiasm for the service, of certain library personnel.

In the university library the set is highly visible and accessible to all library users. It is located in a central place, near the entrance and exit of the library and the ground floor enquiry desk. In the central library and one branch library the receivers are situated in Information and Reading Rooms with few notices in other parts of the library to draw attention to the service. In the second branch library, the set is in the adult section. Teletext (Ceefax and Oracle) pages are usually displayed in the university and central libraries. In all four libraries, Prestel is normally accessed, on request, by a librarian.

For the study, the sets displayed the Budget News and users' reaction to the service was observed.

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Users

Four distinct types of user behaviour were discerned:

(1) *Active users.* Four people interacted with the system (two in the university and two in one of the branch libraries). In the university, one user read the operating instructions, situated beside the set, then spent five minutes working back and forth through the Budget News displayed by the IPs, Viewtel and Fintel. This user was familiarising himself with the service. He was 'learning by doing'.

(2) *Passive users.* Members of this group did not alter the display. Many would note a screenful of information and then return later to see if this had changed. Clearly, some 'passive users' had incorporated the service into their library behaviour. In the university, for example, they made a point of reading the display on entering the library, before utilising any of the library facilities or they automatically turned their heads to read the screen as they walked past it. The majority of 'passive users' glanced at the terminal and read the information shown as they carried out other activities, such as, walking around the library, putting on coats, making enquiries, filling forms, etc. Only a few readers stood in front of the terminal to note the display more thoroughly.

(3) *Imitators.* Non-Prestel users would wonder what users were looking at. They would follow their gaze and imitate the users by reading the display themselves.

(4) *Librarians.* Three people called into the libraries to ask for the latest Budget News. In each case, the librarian accessed Prestel and conveyed the information to the user who was satisfied with receiving it via this intermediary. In a branch library, the only user of Prestel was the librarian who accessed the service four times.

Problems encountered

Out of the four 'active users', two had difficulties—they disconnected the service. In one case this occurred by the user pressing the TV button on the remote control keypad. Other Prestel users have attributed such errors to poor keypad design.

None of the users consulted hard-copy directories and only one used the operating instructions. They all conducted searches by trial and error learning. No technical problems were encountered. The main difficulties resulted from users' unfamiliarity with Prestel.

Librarian's comments

There was concern about the costs of using Prestel. This has had certain consequences. Teletext, where available, is normally used for news, sports and weather because the service is free. In one library cases of users accessing expensive pages and spending long periods of time on Prestel have been interpreted as 'misuses' of the service. In all the libraries public access to Prestel is restricted in that library users have to ask the staff to conduct searches for them. Staff familiarisation of Prestel is limited by the fear of incurring high usage costs. 'In-house' training is also expensive in terms of staff time.

Staff in one library complained that there had been no co-ordinated training programmes to develop the access and manipulation skills and acquire knowledge of the data available. Only one librarian had attended a training course. This had lasted for a few hours and had been organized by the Deputy Director of Information Services at Cheshire County Council. Otherwise staff were self-taught.

The librarians regard Prestel as a 'serious' information source, providing 'hard facts'. They are concerned lest it be 'trivialised' by an emphasis on games and other 'entertaining/frivolous' material. Logs of usage kept in three of the libraries demonstrates that Prestel is used to obtain 'serious' information—financial, statistical, building and construction, travel and career details—and that businessmen and young people are the main users of the service. In these areas most of the staff have begun to 'think Prestel', to use it as a first source to answer queries.

Prestel allows librarians to deal with enquiries for which they need the service, such as current holiday offers, and may attract new types of users to the library. Alternative reference material is more comprehensive for other queries, for example, historical data. Some questions could not be answered by Prestel nor by existing reference stock—European telephone numbers, details of foreign companies. It was thought that Prestel would not replace the purchase of stock but in libraries where funds for reference material were low it could become a valuable tool to deal with enquiries.

Budget News

Six IPs covered the Budget: Baric, The Economist, Fintel, Peat Marwick Mitchell, Tolley and Viewtel. The Budget News was structured and presented in different ways by these IP. These included a Budget Poll asking users to 'predict the Chancellor's measures—how much on tobacco, petrol, alcohol' (Baric); discussion of the options open to the Chancellor and the course actually taken by him (The Economist); display of headlines/series of statements (Fintel and Tolley); headlines and commentary (Viewtel); and tabular representations of the changes brought about by the Budget (Peat Marwick Mitchell).

The Budget News was rapidly gathered, edited and transmitted. Within ten minutes of the Chancellor beginning his Budget Speech details of it had appeared on Prestel.

Viewtel devoted the most editorial space to the Budget providing both headlines and commentary. The approach taken was evaluative and 'leading', drawing users' attention to certain items and emphasizing a consensual image of society. Viewtel was supportive of government policies, critical of unions and industrial action—focusing on the results of such activity with no mention of the causes for it—and concentrating on the 'personal' issues of the Budget, how it affected individuals as consumers. This can be seen from their main headlines listed below:

'Civil Service bid to sabotage the budget'
'The Chancellor and your pocket'
'Bad news for drinkers, smokers, drivers'
'Change of course "would be wrong" '

The evaluative nature of Viewtel's presentation is reinforced when compared with that of another IP. Consider, for example, the treatment of inflation. Viewtel writes: 'Real progress made in fight against inflation' whereas The Economist states: 'It is expected that inflation will rise by 10 per cent next year'.

Summary and conclusions

A number of important points emerge from this study.

The presence of Prestel in a public place, like the library, does provoke a great deal of interest. Library users were aware of Prestel and had integrated usage of it into their routine library behaviour. This is portrayed by the amount of usage made of Prestel on Budget Day.

Library	*No. of library users*	*No. of Prestel users*
Branch	50	43
Central	15	12
University	70	64

(Figures were not recorded for the other branch library).

Users tended to treat the service as a quick information source which could be read as they carried out other activities. Many users returned to the set at different times to see if the information had changed. Few interacted with Prestel or asked library staff to do so for them. No-one used a hard-copy directory (because searches for specific items of information were not conducted?) nor jotted down information obtained from the screen. 'Active users' preferred to find their way through the database by the indexes on Prestel. Imitation of behaviour was important in diffusing knowledge of the service, indicating the value of locating Prestel in public places.

The analysis of the Budget News showed that the interactive nature of the medium can be used to collect opinions from the public and that up-to-date information can be disseminated.

Prestel is not a 'neutral' system. The news is not collected and displayed in a manner which purely reflects reality. Rather information is interpreted and structured in particular ways by IPs. Further, material is presented in a stark and brief fashion because of the constraints imposed by the medium. Does this make it more or less authoritative than alternative media, for example, radio, TV, newspapers, word of mouth? The form of presentation coupled with the way most people use the service—read, disappear, return—affect users' interpretation/knowledge of what is actually happening, at different moments in time. No radical criticism of the Budget appeared on Prestel despite a background of concern about government policies and the effect of these on the economy.

General comments

Libraries are important places for spreading knowledge of Prestel. Alternative sources of funding should be considered given the present concern about usage costs and the restrictions this imposes. Librarians are beginning to 'think Prestel'. However, they should continue with in-house training if the service is to become fully integrated as a reference tool.

It is important to have a number of IPs taking different approaches. The system should be opened up to include more public participation in the types of information displayed, for example, community information, alternative political perspectives. Libraries could be a mechanism by which this happens.

ACKNOWLEDGEMENTS

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The UK Serials Group

David P. Woodworth

Loughborough School of Librarianship

Introduction

THE FIRST TENTATIVE steps towards establishing some form of organization catering for those interested in serials was taken after a conference organized by Blackwells, the Oxford booksellers, publishers and agents in 1975. Immediately following this conference, and profiting from the impetus created by those librarians present, another meeting was arranged at Leicester University consisting primarily of librarians, resulting in the formation of a small ad hoc working group to consider the matter further. No 'brief' was given to this committee but the feeling of the meeting as a whole was that what was needed was not another organization which merely organized meetings but one which would become a pressure group on behalf of interested bodies and individuals. Consequently it was resolved that a Serials Librarians Group be set up.

Progress towards the more formal establishment of the Group was slow and further activity by the committee was in fact limited. Sensing that a final push was needed, Blackwells called a second conference in March 1977 and by the time this took place the working group was in a position to present proposals to the gathering.

One of the main proposals was that a serials *librarians* Group was too constricting and that what was needed was an organization which would bring together and foster a dialogue between *all* parties interested in Serials in the broadest possible context—librarians, booksellers, Serials agents, publishers, information workers and individual users. So was born the UK Serials Group which was thought to more adequately embrace the collective interests of the parties we had in mind and, in addition, would allow for overseas interests to undertake limited participation.

One of the more important early decisions that had to be made was the question of allegiance to an existing organization, as a specializing section or whether autonomous existence could be justified. After very careful consideration it was decided that because of the constrictions of the rules and regulations of existing bodies, it would be in the best interests of all that the proposed group be completely autonomous. In this way complete freedom of expression, and decision making was ensured.

From the outset there was a conscious aim to avoid over representation by any one class of interest but as membership has grown a majority do seem to be drawn for the academic area. Unfortunately this has led to the assumption that the Group is 'for academic librarians' when this is patently untrue. We realize that there are very large periodical departments/users in public and special libraries and their participation would be, and is, welcomed. Despite the predominance of academic membership the committee represents a wide membership base and currently is made up of representatives from publishers, agents, industry, university, college, library, education, and the national library.

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Having taken the decision to 'go-it-alone' formal establishment was the next step and this was accomplished at our first conference at York in 1978 with Dr David Wood of the British Library Lending Division as chairman.

Some discussion was given at the outset to the new group's aims and objects and these were decided as:

1. To encourage and promote a continuing discussion connected with serial and associated areas between all interested parties in the information industry, both nationally and internationally.
2. To develop and maintain links between the producer and the end user of serials.
3. To encourage and assist in the development of appropriate research in the field of serials management.
4. To be the natural articulator on serials in the UK.
5. To further these objectives by means of meetings, seminars, course, conferences; by publications; by representation or relevant bodies, organizations and committees; and by encouraging the free flow of information between interested parties.

Membership

For the first three years no membership fee was charged and the necessary financing of activities was provided by small profits from the various undertakings or through the good offices of sympathetic organizations. The main reason for the decision not to charge a subscription was quite simply that (a) officers and committee had plenty of work to do in their own right without unnecessary extra burdens and (b) the establishment of the usual infrastructure needed to keep track of members was, in itself, cost generating.

However at the last (1981) AGM the proliferation of members and their duplication from particular organizations forced a policy re-think on this matter, the result of which is that a nominal fee of £10 per calendar year is now charged to any person or organization which (a) effectively provides one vote at an AGM, but (b) also allows any number of other representatives to attend functions and to receive publications at reduced rates.

Membership is rising steadily both in the UK and abroad, and anyone interested should contact the Secretary at Loughborough School of Librarianship.

Activities

The Group has already held, and plans to hold, a number of meetings on varying subjects in different locations. The main get-together for members is the annual conference and AGM and these have been held successively at York, Loughborough, Cardiff and Manchester with themes successively on Non-conventional serial publications; Financing serials from the producer to the user; Automation and serials, and Resource sharing—its impact on serials. The next conference is scheduled for Canterbury in the spring of 1982 under the theme of 'The Information Chain'. At this it is hoped to have a real dialogue between all who contribute to the journal—authors, editors, publishers and users.

A number of one day courses have been held in Birmingham, London and Newcastle on such subjects as 'Serials and AACR 2' and 'Matters of concern: issues in serials librarianship' where topics such as the future of the serial, the effect of expenditure cuts, and the impact of new technology were discussed. A new concept in integrated courses was experimented with in the autumn of this year when a two part course on serials work for junior and non-professionals was run concurrently at four centres with two weeks between each part. The theory was that probably junior staff could be spared for one day at a time but more than that delays the work of the library. In the event these were a great success.

Representation on the committee considering the requirements of the, now published, new standard on Serials Holdings Statements was maintained for some eighteen months. Individual committee members have also had the chance to reflect the Group's view on various other committees of which they are members—such as, for instance, the successor to BUCOP.

In certain cases the Group is also willing to bring pressure to bear on behalf of members. One recent case concerned the illogical publication schedule of the index to an American journal. This was followed up on behalf of the University of Leeds Dental School Library and a mutually satisfactory conclusion reached.

Publications

Efficient communications between a far-flung membership is vitally important to any organization. Recognizing this, a newsletter was established at a very early date and this is now published twice a year. The first few issues contained mainly news items but, increasingly, more substantial items have made their appearance, resulting in an increasingly valuable primary journal.

Material of more archival value is published in a Serials Monograph series and the first three titles represent the proceedings of past conferences. It is not intended that the series be reserved solely for conference proceedings, and other material may well be included dependant on demand in the future.

Due to the increasing importance of publications, and the need for more in this field, a publications sub-committee has been established to co-ordinate future policy. There is no shortage of suggested titles and therefore much work needs to be done before they all see the light of day. However suggestions are always welcomed and an examination of existing manuscripts may be considered.

Earlier this year the first example of diversification became evident on publication of the Directory of Title Pages, Indexes and Contents Pages (DOTIC). Basically this is a list of 7000 titles with details of their index availability. Drawn up as an end product from questionnaires sent to publishers world wide, it is hoped to make the work ever more comprehensive by updates every 2–3 years. A 3rd edition of the Guide to Current British Journals will be published shortly. Both publications have been produced in co-operation with the BLLD.

Research

Serials education has always been a vexed topic among serial librarians and the range of treatment afforded them in our library schools varies to a considerable degree. In an effort to obtain concrete opinion (a) from those on the receiving end and (b) about the actual treatment of serials education in schools, a short piece of work is scheduled for the coming year when it is hoped that, as a spin-off, the relevance and efficiency of existing texts will also be ascertained. The results of this may be available as a Monograph.

The foregoing has been by way of a progress report of the first three years of the Group's life. To those who doubted that there was a place for a new association, let alone one so specialized, it will I am sure be obvious that its impact has been felt, is growing rapidly and will continue to grow. In this way its establishment has been justified.

THE NEGLECTED RESOURCE:

NON-USAGE OF LIBRARY-INFORMATION SERVICES IN INDUSTRY AND COMMERCE

Margaret Slater

Considerable thought, time and funds have been invested in past attempts to identify the needs and wants of users of library-information systems. Comparatively little effort has been put into parallel study of non-users.

This study represents an attempt to redress this apparent imbalance. Experiences of library-information managers were sought, recorded and analysed. Coverage included causes and cures of suboptimal usage. This report is the first instalment of a planned series of projects and publications concerned with different aspects of the under-exploitation of industrial and commercial library-information services.

Ultimately the studies envisaged have practical aims: to cut down on wastage of an information facility provided by employers for employees; to help these employees work more easily, efficiently and with greater job satisfaction; by so doing, hopefully to increase work productivity.

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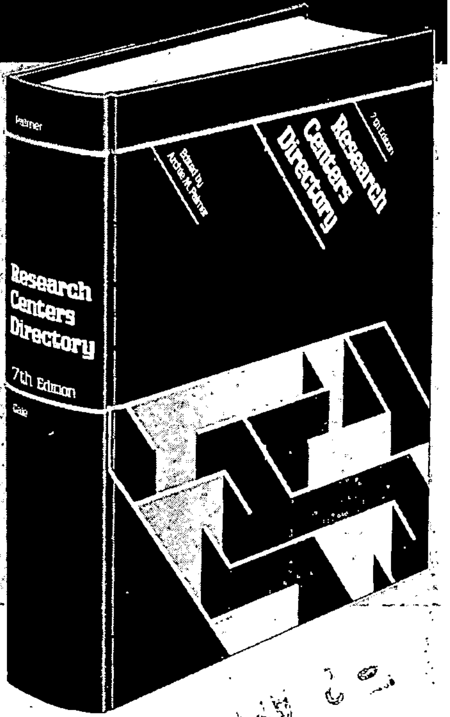
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The University of London's Union List of Serials

Linda Rodgers

University of London Library Resources Co-ordinating Committee

Paper presented at the Aslib Biological and Agricultural Sciences Group Meeting, Aslib, London, 18 November 1981

RESOURCE SHARING is not an idea that is new to the University of London. Indeed the need for this has been recognised for many years but several factors have long prevented its realisation.

First, although the University has all the appearance of a ready-made cooperative being a federal institution comprising 60 schools and institutes, each one of these bodies is independently-administered and separately-funded. Direct central control has always been out of the question while the introduction of any form of centralised services represented a major change of direction and policy after a long history of separate development. Second, the geographic spread of these institutions has always militated against the creation of shared services, while their different traditions and procedures contributed even more to the problem. However I must say that over the years there had grown up pockets of localised informal cooperation usually on a subject basis. Finally, the creation of a central body to coordinate the rationalisation of the services of these institutions and central funding to make its work possible was essential before the first steps towards resource sharing could be taken, and this could only be achieved after much preliminary consultation and discussion.

This was carried out in the late 60s by the Committee on Library Resources whose report was published in 1971. It contained a study of the University's library services and made recommendations for their improvement. It explored each subject that was taught in the University and came to conclusions about the future of each.

For instance, the main collection in Agriculture is at Wye College, and the report therefore recommended that its library should aim at a high degree of self-sufficiency, as other collections, such as that in the history of agriculture in the University Library, did not overlap with it to any great extent. In the Biological Sciences, it was found that there are collections in a very large number of institutions. As a result the report felt that rationalisation, especially in periodicals, should be investigated. As for the Medical Sciences, half the libraries in the University are concerned wholly or in part with medicine. The Committee found that most of these institutions were unable to fulfil the needs of their users to quite a considerable extent, especially in undergraduate provision. There was then a certain amount of cooperation in lending on a local basis, while most libraries distributed to others a list of their current periodicals holdings; but resource sharing was not highly developed. The Committee felt that a union list of serials would be useful in the extension of this cooperation, especially as it had

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established that the overlap of titles in the medical collections was surprisingly low—of 2,180 medical titles investigated, 1,053 were taken by only 1 out of 32 libraries, only 434 in more than 5 of these libraries, and 77 in 20 or more libraries.

So the conclusion of these surveys was the strong recommendation that priority should be given to the creation of a machine-readable list of serials which would provide readers with a much-needed findings list and librarians with the information for a rational approach to cancellation and purchase. These wheels were to be set in motion as soon as a central organisation had been set up to coordinate the rationalising activities envisaged by the Committee on Library Resources.

This new body, which became known as the Library Resources Co-ordinating Committee or LRCC, was constituted in 1973 as the body which would, in the words of the Report, secure the development of the library resources of the University on the most rational lines, discuss and recommend measures for cooperation and the coordination of resources in the London area, and have responsibility for the central library services of the University. As I have said, there was no question of central control of our independent schools and institutes; these remain the responsibility of the institutions concerned and receive financial support from them. Safeguarding and improving the services and collections of our 60 library systems could only be achieved with the active cooperation and support of their librarians. Our solution was to create a network of subcommittees reporting to the LRCC which fostered and encouraged university-wide interest in and cooperation with the activities of the LRCC staff.

This central staff began in 1974 to investigate the means by which information on the University's considerable periodicals holdings could be gathered, printed and disseminated, once preliminary agreement had been given by the librarians to allow their serials data to be entered and published in a single list.

At this time periodical subscription rates were soaring and the University's collections were threatened by the spate of hasty and haphazard cancellations which was necessitated by the unprecedented circumstances. Now the Union List project was invested with even more importance as librarians realised the potential value of up-to-date university-wide information on current titles. This situation gave the planners an added sense of urgency and very soon a skeleton scheme had been designed to which flesh was to be added in the succeeding months. Librarians as well as programmers and systems analysts were involved in the planning for the project but as you will see even then mistakes were made. This was due basically to the fact that at the time there was no comparable system from whose experience we might learn.

As you might imagine, the 60 libraries presented the project staff with a multiplicity of subject coverage, procedure and size. The subject range is total but the depth of coverage varies from library to library, procedures seemed to vary just as much, while staffs range from 1 qualified librarian to 50 members, and collections from 28 titles to over 25,000. A variety of cataloguing rules were found to be in operation while the type and extent of entry ranged from short title to complete bibliographic record. No system could hope to accommodate fully such diversity and so the planners' aim was to strike a balance in order to realise the broad objectives of the project.

Although the project was primarily to create a list of titles and not a catalogue, it was agreed that a set of rules would be essential for the merging of records created from different schemes. The need for swift results was urgent and so the recataloguing of the entire collection from source was simply not feasible anyway. The system would rely on the reinterpretation, where necessary, of existing records and for this rules with the clearest guidelines would be required. We therefore chose the Anglo-American Cataloguing Rules. We were further persuaded by the fact that these rules are the best adapted to automation. Their adoption by later systems has served to confirm this conviction.

In addition the value of incorporating the new international standards was recognised, and so it was decided that input to the files would conform to the guidelines set down by the International Serials Data System; this included the use of the ISSN as the basic control number. It was also resolved that output from the database would reflect the prescriptions of the International Standard Bibliographic Description. The adoption of these new standards was a gamble at the time, but one which has paid off.

One decision that was less judicious was the use of another system's records as an initial database. Here we set too much store by the fact that the overlap between their titles and ours was very high, without looking deeply enough into the compatibility and reliability of those records. Their use promised us considerable economies of effort and time in building up our own file. Since the question of speed was paramount, this seemed a logical answer to our needs. However we soon learnt that initial savings at the input stage were largely cancelled out by the editing and enhancement that had to follow.

Apart from the prescriptions I have already mentioned, the systems design had to take account of 3 major aims: to produce a union list of holdings, to provide individual library lists and selective subject lists from the main database and to provide the facility for the permanent maintenance of this file. For this the planners eventually chose direct online input to a computer-held file via video terminals as opposed to a batch processing system where data on forms is key punched and then fed into the computer in batches. Although an online system requires more complex programming and is more expensive in computer time, it was chosen after an investigation of the potential size of the file and of the degree of overlap between the holdings of participating libraries convinced the planners that its adoption was essential.

The calculation of potential size, though only an estimate because exact figures especially of dead titles were not always available, arrived at a possible maximum of 70,000 titles and one of over 100,000 holdings. The degree of overlap of current titles between our general collections was rarely below 50% and in a few cases was as high as 75%. It is in the collections of our specialised schools and institutes where overlap with each other and the existing file is comparatively low, and it is mainly this contribution which makes the potential number of titles so high, compared with the number of holdings.

With this in mind, the immediate input of records via video terminals permanently online to a computer appeared to be the most practicable way of creating a union list without risking potentially extensive duplication of entry and less-controlled standards of input, and yet still allowing a fast growth rate. We were fortunate at this time, and indeed ever since, that spare capacity was available on the University's central computer and this was made available to the Union List project.

The decision on the staffing requirement for the project was dictated by similar considerations as those of size. The planners were again convinced by the scale of the task that, to ensure quality, consistency and rapid results from the first, a permanent editor was required. Further central staff was then not feasible, so it was planned that the scheme would have to draw on members of staff from each library to prepare and input their data to the file. This meant that we would have to rely largely on the ability of each library to release members of staff to come to Senate House where the project is centred. As you are all aware, the deepening financial crisis in libraries has meant the freezing of posts at many levels and this has inevitably had repercussions on our approach, developing in us a flexible attitude to the work in order to make the best use of available resources. In addition from 1977, the project has received considerable impetus from a special grant to enable us to employ a temporary library assistant to help in data preparation and input.

The final but very important element in our planning was the programming to make these plans a reality. The urgency of the situation and our own lack of suitably experienced programmers at that time made home-grown programming for such an ambitious project impracticable. The alternative was the adaptation of existing MARC software and here too we created problems for ourselves. After investigating a short list of possibles, our planners came up with only one candidate which met all our needs—the TeleMARC package marketed by Tele-computing Ltd. Discussions with this company followed early in 1975 to investigate the possibility of their producing a package specifically designed to process serials records and incorporating significant modifications to meet our needs. An agreement was soon reached and Telecomputing undertook to carry out these modifications within a timescale which would allow operational use of the system by September 1975.

Unfortunately when the programs were delivered—and some didn't arrive for eighteen months—they were not fully operational, and field trials had to be conducted on site for a year before, for instance, the online program worked satisfactorily. Purchasing a commercial package had its advantages. The sophistication of the system was such that it would have taken the University a considerable number of man-years to produce a comparable package. However it does mean that any work on the system is out of your control and you seem to be dependent on people whose interests do not necessarily accord with your own.

Another thing that we also learnt in these dealings was the value of a specification wholly understood and agreed by both sides. We both thought we had grasped the finer points of ours but later we were to learn otherwise. This was especially serious in the question of the printing onto COM of accent marks and special characters. We have these diacriticals stored in the database but the print programs are unable to output them. This inability has made a nonsense of certain entries, particularly in some slavonic and oriental languages, and it is our priority to correct this.

We have been creating our database since Autumn 1976 and so far have 45 out of the 60 libraries in the system. These have contributed a total of 111,000 holdings statements and 60,000 bibliographic records. From this you can see that our original assessment of potential size has rather underestimated the final figure. This you may remember was over 100,000 holdings on 70,000 titles. Now I estimate that when all the University's libraries have entered their retrospective files, we shall have a total of some 130,000 holdings on 80,000 titles. This is of course not a final figure because each library is continually updating its holdings data.

In the final section on this paper, I should like to pick out a few more problems that we encountered and also outline the future.

As I have mentioned we found many different cataloguing traditions in our libraries and having decided to use AACR we were laying on some of our users a quite heavy burden of reinterpretation, if not full recataloguing in some circumstances. However a shared record system cuts this burden down to a minimum and only requires a degree of reinterpretation at the initial search stage for most titles. Once a record has been located on file, the library has only to add its holdings statement and decide if it agrees with the bibliographic data already in the system. After the library has identified all its overlap titles, it then has to create entries for what are at that time titles which are unique to it. And it is this burden, particularly heavy for libraries with specialised collections and less modern systems of cataloguing, which is irreducible.

Our libraries have equally varied approaches to the format and extent of cataloguing data which they make available to their users. At one end of the scale is the short title listing, at the other the full bibliographic entry. We felt that a system which could provide both ends of the spectrum with their needs would be the easiest to sell to potential participants. Given the nature of our organisation, we were aware that we had to make participation worthwhile, and good and variable output together with minimal effort is an attractive incentive. We were fortunate that the software package which we bought was capable of modification to allow us to output our records in variable format. Thus we can produce a listing by title only as well as a full bibliographic entry with all added entries.

Another ace in this pack is the University's possession of chain printers which produce printout in upper and lower case and which helped us to convert some of our users away from their traditional and often justified dislike of computer output. Separate library lists and subject listings are usually produced on printout while the Union List which is now in its 10th edition is published every May and November, produced by COM techniques on 24 and 48 times reduction microfiche.

Accessibility to the collections referred to in the Union List of Serials is a facet of resource sharing where fact does not always match aspiration, though I think it is fair to say that many libraries have relaxed their rules to a certain extent, and some quite considerably, over the years. A system of day tickets to allow access to other libraries has been instituted and this has enabled the collections to be more fully exploited, while apparently not stretching the resources of the holding libraries to an unacceptable degree.

Finally the Future. We have no plans to extend resource sharing based on this system to incorporate accessioning or purchase. It is probable that the independent nature of our institutions and their geographical spread would militate against the economic operation of such schemes, while at present the funds to implement them are simply not available.

However resource sharing in holdings information and cataloguing data has been extended as the Humphreys' Report of 1971 first envisaged. Not only do we now sell our data on microfiche and magnetic tape to organisations outside London University, but we also have begun to have other libraries join the system. The first has been the India Office Library and Records which joined in 1980 and whose collection is enhancing the value of the list in the Oriental field. Certain other organisations, particularly in the medical field, have expressed an interest in joining the system and this is being pursued.

I hope that this brief description of the Union List System, its development and problems has given you an insight into one aspect of resource sharing in London University.

The scope of agricultural serials literature of the Science Reference Library

George Jackson
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Paper presented at The Aslib Biological and Agricultural Sciences Group Meeting, Aslib, London, 18 November 1981

WHEN FACED WITH a subject such as the scope of Agriculture in SRL one is apt to say that almost everything is held and then to be faced with an irate reader who can't find just the one thing he has come all the way to consult. This may be inevitable with a large collection, where gaps are not found by staff until a missing item that somehow ought not to have been overlooked, is specifically requested.

In common with other large institutions, the SRL's holding of agricultural literature appear to have several peculiar idiosyncrasies and inconsistencies which are best understood in terms of the history and policies of the Library since its foundation.

The origins of SRL are found in the Patent Office Library, which was founded in 1855 to give a service to the inventor and the entrepreneur by providing scientific, technological and patent literature for all who sought information from it. The Library was open to the public and the stock placed on open access and was originally required to have 'mechanical and scientific works of every age and people' and was furthermore to cover materials 'indispensable to the right direction and advance of British Industry'. Agriculture being a well established British industry was well represented in the literature of the time and much of the core collection at SRL originates from the Patent Office Library. Some of the inconsistencies also arise from this period. For example after the first phase of acquisition the original cover was narrowed to the more patent orientated industries and languages were restricted to those of Western Europe.

The Patent Office Library existed as such until 1966 when the National Reference Library of Science and Invention came into existence under the aegis of the Department of Printed Books at the British Museum. The move had been initiated in 1951 and in the three years prior to 1966 the Museum had already started to acquire literature for the new library which extended the scope of the Patent Office Library. This extension was in terms of a comprehensive coverage of published literature in all branches of natural sciences, engineering and technology likely to be of value to the public engaged in scientific or technological research and development and in the case of the periodicals from all countries and in all languages. The collecting was extended by making use of the resources of the British Museum, but transfers from stock were limited in most cases to post 1930 items. Pre-1930 materials were kept at the Department of Printed Books, where many still remain. A further date complication arose about this time because of the problems of accommodation. That part of NRLSI

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which was accommodated at the Patent Office and to become known as the Holborn Division, disposed of much of its stock published prior to 1910. Materials supplementary to the Patent Office Library were moved into part of Whiteley's Store and became known as the Bayswater Division of NRLSI and at the time were mostly post 1950.

Following the Enabling Act of 1972 the NRLSI became part of the British Library and became known as the Science Reference Library with Holborn and Bayswater Branches. The Agricultural holdings housed in the Patent Office were gradually transferred from Holborn to Bayswater and are now at the Aldwych Branch. Accommodation for the Library is still however not satisfactory and exploitation of the Agricultural literature requires some knowledge of the present disposal of stock between Aldwych (Kean Street reading room) and Aldwych (Micawber Street reserve store) and Holborn (reading room).

The present policy of the Library in broad terms is set out in the pamphlet on the Science Reference Library 1981 as making 'information from its wealth of literature readily accessible to research and development, to scientists, technologists and engineers, to industry and to those who work on their behalf' and by providing reference and research material and referral services. The criteria for the acquisition of Agriculture are more specifically given in the staff's guide to selection which reflects the aims set out above.

Although all languages are covered by the SRL, its especial strength lies in the English language collection which survey has shown to be overwhelmingly the most used. SRL acquires the copyright issues of a large number of British publications via the Copyright Office. The exceptions in Agriculture being that works dealing with financial, social and political issues or works of 'low' value are retained by the Official Publications Library. The rule does vary in both cases. If for instance Agricultural development is the subject matter of a periodical and thus embraces both systems and economics the material is acquired if systems and technology are judged to be about 50% of the whole. The question of acquiring items of 'low' value is more tendentious, but it is interpreted in general that magazines of national or specialised status are taken whereas particularly local, county or glossy journals are retained by Bloomsbury. In some cases material dealing with agricultural economics is also considered to be a necessary adjunct to acquired items, for example agricultural statistics on a national scale or surveys of agricultural produce and commodities and these will be purchased whilst the copyright copy remains at Bloomsbury.

A second major source of English language publications is through the exchange programme of the Official Publications Library. This source gives access to much of the material from the USA and the Commonwealth, EEC, FAO and OECD. The same ground rules apply as for the copyright intake.

India is a country which produces many journals relevant to tropical crops and agriculture in English. They are well represented at SRL and largely unavailable elsewhere.

Other European languages in roman scripts and English language foreign publications are adequately covered since selection policy allows for local specialities to be taken and Agriculture is by its very nature largely country and system orientated. Purchase plays a large part in this area and more stringency may apply in times of economic pressures.

Exchange, donation and purchase schemes all operate for Russian language journals and there is a large collection of East European literature at the Aldwych. It is especially fortunate that one of the exchange organisations is the *All Union Academy of Agricultural Sciences* which results in particularly good coverage. The *Lenin Library* also participates in the exchange scheme as well as other organisations related to Agriculture such as the various soil science institutes. The Russian language area is unlikely to experience economic cuts.

A large number of Japanese Agricultural serials are acquired by exchange and donation. In the top class of Agriculture alone, over 200 titles from Japan are available. The fact that they are all together in one library makes the overseeing of this source of information valuable to abstractors who understand the language. They are not however outside the scope of others since many have English summaries and the library has resident experts who will aid readers in the use of particular articles to which attention has been drawn. China has also recently resumed her output of scientific literature.

The serial literature at SRL can be divided into several categories.

The SRL acquires all, with the exception of a few poorly indexed items, *abstracting and indexing journals* in its field. Thus agriculture and the biological sciences are very well represented. About four hundred abstracting periodicals are at the Aldwych, of which more than half are of direct use to the Agriculturist. Some of the more important ones are also at present duplicated at Holborn. The SRL agricultural abstracts collection is therefore a very strong asset for a library of first resort being backed up as it is by an on the spot database terminal and appropriate staff.

Research and scientific publications in the form of *main stream journals* are comprehensively acquired in all languages and from all countries. They include agriculture and its associated industries, agronomy, animal husbandry, soil science, agricultural engineering, crop and breed journals, phyto-pathology and veterinary medicine. Furthermore the collections are strengthened by journals fringe to agriculture in both biological and earth sciences which are at present accommodated in the same building.

A great deal of agricultural literature is to be found in *reports* from various research institutions and government bodies. Their content is akin to that of the research journals but one issue tends to be devoted to one subject. Because of the Copyright Act and thanks to the Official Publications Library report series are widely covered at present.

Reviews and literature containing *review articles* are well covered at SRL. Particularly valuable are the annual series termed 'advances in' 'progress in' or 'annual review of,' which summarise and evaluate the literature and provide extensive bibliographic details. In some cases where distinctive titles for each issue are identifiable they may be treated as books. *Review articles* often appear in the more popular, as opposed to scientific serials. Where these are not obtained by copyright they may cease to be acquired if financial restraints continue.

Annual reports are of two kinds, those dealing with research summaries and activities of stations and institutions and those which deal with mainly administrative matters. Both are taken but the most useful are those which give coverage of experimental and research programmes in some detail.

Within the scope of the Copyright Act most British farming and horticulture *magazines* are taken. The coverage is not so comprehensive for countries outside the copyright catchment although at present it is quite wide. The argument being that the magazines of high quality do contain up to date information on the state of the art in the various countries represented and also carry market and commodity information. Financial stringencies are likely to hit this section.

Among other annual publications *herd books, stud* and *flock* books are acquired from the British societies which cover the breeding of groups of animals. Private herd books are usually not taken and foreign items are only taken selectively usually where the breed is of British origin.

Conferences may be held annually or at longer intervals. They are well covered by SRL, but may be treated as books rather than serials if there is any doubt about their continuity.

Technical literature is well represented especially from the United States of America where every state has its own agricultural set up producing bulletins, circulars, technical bulletins and miscellaneous publications. They contain a vast corpus of knowledge from the detailed to the trivial. They are mainly treated as serials at SRL, but a few, in which the better material is sparse have been treated as books. Other countries besides the States also produce this type of literature.

A whole section of the agricultural collection deals with items best classified as trade and commerce. *Directories* which appear each year are treated as self relegating serials where the back numbers are kept for a selected number of years depending upon content or archival value. Other directories are to be found either in or as separate issues of regular periodicals. SRL takes many thousands of *business and trade journals* from all parts of the world. Those relating to the life science industries are kept at Aldwych with other journals in the field.

House journals published for share holders, staff or customers which contain substantial technical information are also taken and shelved with the journals. Less substantial ones are housed with the Trade Literature and are not catalogued.

Trade literature in hard copy and microform is housed at Holborn and contains material from about 8,500 companies, mainly British and containing Agricultural information, especially in the equipment, machinery and agrochemical fields. The trade literature is held in order of company name but entry to the collections can also be found through product indexes in the trade directories.

Statistics, price indexes and commodity indexes are held as separate publications and also found incorporated in the journals.

Literature dealing with *extension methods* in agriculture is taken selectively. Education as such is a Bloomsbury priority, but extension appears in many guises and in particular in those series termed technical and as such are taken as serials even though they may be more often educational in nature.

The acquisition and retrieval of 'grey literature' has become a favourite topic in recent years. SRL gathers a great deal of it by copyright and official exchange programmes and through recent efforts to cover the AGRIS list of serials. ADAS has recently started to deposit such items as reports on academic visits, but there is no doubt that expansion of the collection is possible if more organisations send literature to the CRO and then if acquired by SRL it would be catalogued and made retrievable. If such literature is produced upon a regular basis cataloguing and retrieval will be made easier if the series carry definite titles and numbers.

In conclusion SRL can be said to have a comprehensive Agricultural collection in all branches of agriculture and associated industries except economics, statistics and social science. Whilst it has by no means an exhaustive collection it is likely to cover most materials of value and where gaps occur, the library can usually provide a useful referral service through its back up collection of directories, bibliographies, library catalogues and other information sources elsewhere in the British Library.

Serial holdings of UK Marine and Freshwater Sciences Libraries: union list problems

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Paper presented at the Aslib Biological and Agricultural Sciences Group Meeting, Aslib, London, 18 November 1981

THE U.K. MARINE and Freshwater Sciences Libraries Group is a small group of librarians who have been meeting regularly since 1969 and represents an informal network of cooperating libraries and information centres willing to offer services within their respective fields in the marine sciences. The organisations from three main Government Agencies form the nucleus of the Group namely:

(1) Natural Environment Research Council: Institute of Oceanographic Sciences, Wormley and Bidston/Taunton; Marine Biological Association of U.K., Plymouth; Scottish Marine Biological Association, Oban and the Freshwater Biological Association, Ambleside.

(2) Ministry of Agriculture Fisheries and Food: Directorate of Fisheries, Lowestoft and the Torry Research Station, Aberdeen.

(3) Department of Agriculture and Fisheries for Scotland: Marine Laboratory, Aberdeen and the Freshwater Fisheries Laboratory, Aberdeen.

Meetings are held approximately every 18 months and are attended by wider groupings when librarians from University Departments, Government Departments and others interested in marine science information and literature are invited. To date co-operative projects have produced a Directory of the Group with details of services etc. and a Union List of Serial Holdings.

The first decision for the Union List was whether it was to be a subject listing of marine science journals only, or an administrative record of the complete serial holdings of each library, however irrelevant the title. To maximise resource sharing and to provide an essential housekeeping tool it was decided to compile a complete holdings list which would be in machine readable form for ease of printing and updating. The second decision was what to include: calling it a serial holding list did not define it because in differently administered libraries, serials constitute material much wider than the official definition, including such categories as Annual Reports, Expedition Reports and Report Literature. There were two reasons for including the latter category, one because Report Literature is so hard to trace and two, some libraries treat their Report Literature as serials. This of course was the main problem throughout the project, because each member was autonomous, cataloguing treatment of the same material was different, often for historical reasons rather than present library policy.

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We would have liked to include extra housekeeping information like publishers' addresses, subscription details and missing copies in the entry for each library's holdings, but it was too ambitious and we finally decided to include title, place of publication, individual library holdings and preceding and succeeding forms of title.

A problem with a co-operative project outside an administrative grouping is who will do the work. We were dealing with 6000 titles and with the necessity for cross-checking, the list could not be divided and worked on by different locations.

We commenced by taking the Marine Biological Association library serial holding list and each member adding their entries and new titles. Our first big mistake was to work in abbreviated form of title. As can be imagined where libraries had been unable to trace an official abbreviation, a home-grown one had been entered. It was a nightmare to decipher the list after it had been added to nine different times. Each title had to be expanded fully, and it was then that we found out how wonderful are the various authority files but also how incomplete!

The fact that we were compiling a list of serials held in marine science libraries did not present particular problems since any collection will contain multiple journals with the same title, foreign language titles and unpronounceable East-European titles. The real problems arose from trying to unify the records of different libraries all geographically distant so that checking such queries as different forms of one title, translated titles, dual language titles and abbreviations used, were more difficult and time consuming. It became impossible to make it a complete housekeeping tool for each library; editorial decisions had to be made and it was not feasible to put SEE references from all alternatives.

Holding records created problems—publication date or years for which volume issued?—both appeared; a journal holding would be closed when a title ceased publication, yet one library might still have it indicated as ongoing, or finishing in a year different to other library holding records. It became much more than a task of just combining all library records, it almost became a complete check of each library's records.

In fact editing took two and a half years trying to bring together the serial records of nine different libraries and to iron out their collective mistakes in record keeping that had built up over many years.

Altogether, entry of records and editing took five years, although it must be remembered that we were not working on the list 100 per cent of the time, but only when time was available. The first edition appeared in 1976; the second edition in 1980 involved 1700 additions and alterations to the original 1976 records.

The reason the Group came together was because of the co-operation which was already in existence, so what has been the benefit gained from compiling the Serial Holding List? We each have a computer produced record of our serial holdings, it has provided a marine science subject list of sorts, but obviously with much more peripheral material listed as well; we know what other members hold which speeds up loan requests, disposal of duplicates and disposal of stock when weeding. It enables some rationalisation of subscriptions when regular loans can be substituted or a contents page service provided. Within a Group like this it is possible to reciprocate so that no one library is overburdened. Often with resource sharing the larger unit shares its resources with smaller units but gets no returns.

At a different level within the Group we are resource sharing internationally by all being involved with the Aquatic Sciences and Fisheries Abstracts. The Marine Biological Association is the U.K. focal point and main input centre, with additional input by the libraries of FBA, MAFF Lowestoft and DAFS while IOS provides details of new papers on the physical sciences of the oceans which should be included in ASFA. The next step forward in these secondary services seems to be document delivery—it is one thing to inform of the existence of documents, but where can some of the obscure material be obtained? None of the members of the Group have enough staff to cope with extra loan requests, so rather uncharitably but also because of the specialised nature of our collections, we did not wish it to be implicit when issuing our serial holding list that any title would necessarily be available for loan from us.

You cannot share resources unless you know what resources there are to be shared, that is one reason why we compiled the Serial Holding List; in practical terms however, we lack the manpower resources to operate any ideal system. The UK Marine and Freshwater Sciences Libraries Group is a subject rather than administrative grouping and for any advanced scheme of periodical resource sharing this is a restriction.

The CAB Serials Authority File (CABSAF)

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Paper presented at the Aslib Biological and Agricultural Sciences Group Meeting, Aslib, London, 18 November 1981

THE CAB SERIALS Authority File (CABSAF) is basically a listing in computerized form of all the serials likely to be encountered in the CAB abstract journals and database. Although its primary function is to provide automatic control of bibliographic input to these, CABSAF can also be used to generate a variety of listings useful in agricultural libraries.

Before I move on to talk about the File itself, I feel it would be helpful for you to understand at least a little of how CAB functions. Many of you are of course familiar with our printed and online products, but may not have considered what sort of an organization lies behind them:

CAB is a decentralized, Commonwealth-supported organization comprising four Institutes and ten Bureaux. Each of these units has a clearly defined area of specialization within the broad field of agricultural science, although there is necessarily a degree of overlap between some of these, such as Horticulture and Entomology which share a common interest in plant pests.

Each CAB unit scans and selectively abstracts the world literature within its particular sphere of interest. The Institutes of Entomology, Mycology and Parasitology (formerly Helminthology) achieve their coverage largely through the efforts of their own highly specialized libraries, but they do also draw on the resources of many others including the Science Reference Library and, of course, the ubiquitous BLLD.

CAB's Bureaux are by comparison a rather different kind of animal, each being sited at or near a research organization with interests closely allied to those of the Bureau, which relies on the library of its 'host' organization to supply the bulk of the primary literature for its abstract journal(s). This is never a purely one-way relationship, however, and in several cases the libraries are actually staffed or owned jointly by the Bureau and its host.

A number of non-CAB organizations also contribute to our journals and database either by supplementing the output of one or more CAB units, or by completely filling what might otherwise be a gap in our coverage. One of the older and better known examples of this sort of arrangement is that of *Weed Abstracts* which is prepared by the ARC Weed Research Organization. We have a similar arrangement with the Arid Lands Information Center in Texas, which prepares *Arid Lands Abstracts* and, more recently, the Chinese Academy of Agricultural Sciences began contributing English abstracts of some of the more inscrutable Chinese agricultural publications.

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In a sense, what we have established is a unique and very effective co-operative network of information centres and libraries now covering virtually every facet of agricultural science from entomology to economics. What are otherwise scattered and, in some cases, underutilized literature resources have effectively become a widely shared resource through the media of our abstract journals, database and document delivery service.

The great majority of agricultural research is published in the form of papers in scientific serials, and this is clearly reflected in our own journals: some 80 per cent of our abstracts are of serial literature, and we regularly abstract some 10,000 serial titles in about 30 languages. Ensuring bibliographic accuracy and consistency is of course of major importance, but on this scale and in our decentralized type of organization it becomes a formidable task, requiring considerable clerical and editorial effort.

One way of increasing accuracy while at the same time reducing effort would be to provide for the entry of serial titles in some short coded form which our computer system could recognize and reconstitute in full, complete with accents and diacriticals. A facility of this kind was envisaged when our computer system was originally devised but other more basic projects like the CAB Word List and the CAB Thesaurus had to take priority. However, our new data entry system has provided us with an ideal opportunity to introduce authority files of various kinds, including CABSAF.

We began work in 1977 on the development of CABSAF, collating, keyboarding and editing lists of titles and other data supplied by each CAB input unit. Our first problem, that of finding a simple yet dogmatic definition of a serial, was solved by adopting with slight modification that used by the International Serials Data System:

> 'A serial is a publication issued on a continuing basis and having numerical or chronological designations. Serials therefore include journals, periodicals, bulletins, conference proceedings with invariant titles, patents, standards, annual reports, yearbooks, and monographic series (e.g. "Advances in . . ."). This definition does not include works produced in successive parts for a period predetermined as finite (e.g. faunistic surveys).'

The nature and format of the records on the file are shown in Table 1, and were chosen to facilitate the three main CABSAF functions:

(1) As the authority file for serial titles in the CAB journals and database. A separate subfile will be prepared for each unit and when this is used in conjunction with the data entry system, all invalid titles and misspellings will be rejected; titles entered by means of ISSN or CAB code will be reconstituted in full.

(2) To generate the scanning lists printed annually in each of the CAB abstract journals. As these lists will in future be limited to those titles which are regularly and systematically scanned for abstracting by each unit, they should be of value to librarians faced with the need to cut expenditure on primary publications.

(3) To generate various reference tools for CAB internal use and for outside libraries, etc. The first of these will be the consolidated CAB scanning list which will indicate which units scan each title and whether they actually have the source material available locally for photocopying or consultation.

Specially written programmes also enable us to search the File to find, for example, records containing specified character strings in one or more specified fields. This

TABLE 1: *CABSAF Fields*

Field	*No. of Characters*	*Contents*	*Notes*
1	—	Not yet allocated	—
2	1	M or S	Indicates whether record is a master (M) or synonym (S).
3	255	Serial title	Each title is given in full with a separate entry for each series. Any accents or diacriticals are included.
4	50	Keys of synonyms	Used in conjunction with fields 2 and 11 for cross-referencing.
5	9	ISSN	Programme checks input to this field and flags any invalid ISSN.
6	100	Publisher & address	Not yet in use.
7	50	Country of publication	—
8	1	J, S, or C	Indicates type of serial (primary 'journal', secondary 'journal', conference proceedings, etc.)
9	200	CAB unit code(s)	Each unit can be represented by a single letter which can be modified by punctuation to indicate whether the title is regularly scanned but not held locally (e.g. E+), regularly scanned and held locally (e.g. E), or only occasionally scanned and abstracted (e.g. E!).
10	—	Not yet allocated	—
11	5	Key	This is a computer generated alphanumeric code providing a tag for cross-referencing purposes and for use as a surrogate ISSN.

facility is particularly useful in identifying titles published in, or concerned with, a particular country. Searches of this kind can easily be made subject-specific by limiting them to titles scanned by particular CAB units. Results can be presented either in statistical form (e.g. the number of Chinese-published journals scanned by each unit), or as a listing of the selected records which may be sequenced alphabetically or in one of a variety of other ways.

The various printed lists which will be derived from CABSAF will, I am sure, be of value not just to CAB but also to the many organizations concerned with tracing and using agricultural literature. We hope that the consolidated scanning list will make its appearance next year (1982) and that users will find it helpful in tracing some of the more esoteric serials which we abstract.

Resource sharing in Universities and Polytechnics—possibilities and limitations

Pat Moody
Brighton Polytechnic

Paper presented at the Aslib Biological and Agricultural Sciences Group Meeting, Aslib, London, 18 November 1981

I HOPE TO avoid in this talk issues which are common to all types of libraries. Having previously worked in a specialist medical library and a government library, I hope I have chosen the points which are peculiar to higher education establishments.

I shall try to explain very briefly the budgeting and materials selection policies of higher education libraries (I mention budgeting right away because money is really the major motive behind any resource-sharing endeavour), and in this context, I shall describe in a little more detail what happens at Brighton Polytechnic.

I shall be giving statistics, comments and suggestions collected from a small-scale survey I carried out during the summer among all the schools of pharmacy in the country. The schools of pharmacy—all of which are attached to universities or polytechnics—were taken as reasonably representative of higher education in the biomedical sciences. The survey questionnaire put forward a few proposals for cooperative action, and invited librarians to note potential or existing problems in their own establishments.

Various budgeting systems are in use in universities and polytechnics, but generally speaking, all establishments allot a certain amount to be spent on each course or department. This may be only for books, but may also include periodicals and audiovisual materials. In some cases, the periodicals budget is handled as a completely separate concern.

How the money is spent can be decided in a number of ways. It may be left to a librarian—which is rare. Stock may be purchased when requested by teaching members of the faculty to support courses or research. Items may be acquired as a result of consultation between the library and the teaching staff. Or, as is the case at Brighton, the system may be a combination of all these methods, with the subject librarians having a considerable amount of freedom to purchase what they judge to be useful.

The subject librarian—or Course Resources Officer—at Brighton is in what many would consider a rather enviable position. Every department of the Polytechnic is allotted a professional librarian to look after the needs of both staff and students. The head of department is even on the interview board when a new librarian is appointed.

The Course Resources Officer's responsibilities involve arguing his/her case for an appropriate share of available funds each year, and, having won his slice, dividing that

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up between books, periodicals, audio-visual aids and online information services. Although every Course Resources Officer has to carry out general enquiry work for students all the time and has to man the main enquiry desk for at least one day a week, much of his/her time is spent out of the library in the teaching departments, liaising with staff, assessing needs, advising with reading lists, and showing them what new materials have become available.

All this detail about my job is really intended to show that our subject collections (of all kinds of materials) are very much our personal 'babies'. It is because of this degree of autonomy or freedom that I was able to contemplate a plan for co-operation and carry out the survey I undertook with the full blessing of my Site Librarian.

But all good things must come to an end, and in higher education under the present administration one could perhaps be forgiven for thinking that the end is nigh. Swingeing cuts of anything up to 25% of our budgets are threatened. Staff cuts have already been outlined. Our own library policy is that if the staff are cut, the books and periodicals buying must be cut as heavily, otherwise there will simply not be the people around to process and handle the material.

Like everyone else, we are looking for ways to keep costs down. Whereas subjects such as architecture, business studies, finance, social science spend a much greater proportion on books than on periodicals, in the natural and life sciences, the emphasis is very much more on periodicals. In pharmacy, one third of the budget goes on periodicals, while in some subjects it is only one fifth. What we have to consider is how we can hold down periodicals spending without simply transferring the cost to inter-library loans from the British Library.

It was with this in mind that I attempted a survey of periodicals buying and inter-library loan policies in universities and polytechnics. To keep the survey manageable, I limited it to those which have a school of pharmacy, as I could thereby kill two birds with one stone—get some facts and figures together for this meeting and also assess reactions to the idea of a pharmacy school library network.

One question I put was whether the colleges already belonged to any resource-sharing network. In fact, all of them did belong to some local or regional network, though not necessarily very active ones. It was interesting to note that the networks were based on geographical areas, not on subject fields. Am I right in saying that although librarians personally group themselves by subject—as we here have done—their libraries as organisations do not?

What groupings there are seem to be more by type, e.g. public, government, college, etc. And what co-operation and resource-sharing there is, is so often based on individual librarians who have maintained personal links with libraries in which they have worked, or who have forged new links at meetings and conferences, especially residential ones. There would seem to be a case for more associations based on subject interests.

I am here to talk only about libraries in higher education. The chief characteristic of these libraries is that they are multi-disciplinary, but each one is really a collection of overlapping special subject libraries, with a great deal of highly specialised material.

A university or polytechnic library would need to belong to a number of specialist networks, and problems begin to appear in those establishments which do not have the degree of subject specialisation that we have at Brighton, as there is sometimes no-one to take a personal interest in such a commitment.

I was quite surprised when I joined Brighton Polytechnic how little use seemed to be made of non-BL sources for external borrowing. Our 1980/81 figures put this at only 8% of the total—that is about 400 of the 5,000 requests made. During the month of November 1980—the month in which I joined—the pharmacy department received over 1,100 items from BL but only 15 from other sources. Apart from the convenience of being able to buy BL forms in advance, it did seem crazy to be spending £1.30 on a 3- or 4-page photocopy which another library might well have supplied for 50 pence.

My survey also asked what access the colleges had to local facilities, public or private. I make use of the local Postgraduate Medical Centre in Brighton on a reciprocal basis, and also the Sussex University library. Some used hospital libraries. Others had medical schools attached to their universities. But very few seemed to have arrangements with local industrial concerns. This seems a shame, as most areas have pharmaceutical companies somewhere within reach. Polytechnics especially are meant to have close ties with local industry.

92% of our requests were made to BL. My survey of colleges showed a percentage ranging from 70% to 98% (the 70% figure came from Scotland—perhaps there's a lesson to be learned there!). What does this figure show? Does it indicate a lack of initiative on the part of librarians to investigate alternative sources? Does it show that BL is in a monopoly position, and if so, is this a good thing?

Any library assistant can fill in a BL form and send it off without further thought. Has an important part of the librarian's job simply disappeared because of Boston Spa?

My survey sought to show who created the demand for inter-library loans. Policy varies considerably here. In most places, including Brighton, ILLs are provided to both teaching and research staff and undergraduate students. However, there are colleges where undergraduates are simply not offered any inter-library loan facility at all, or where the service is available in the final year only.

The majority of those in the survey did not pass the cost on to the user unless it was excessive. There was an interesting variation in the ratio of student to staff ILLs, ranging from 50 student/1,450 staff to 480 student/180 staff.

Other services to students and staff were fairly standard—coin-operated photocopiers for students and free copying for staff. Many libraries share the anomaly that if the item is in the college library, the student pays to copy it himself, whereas if the item has to be ordered from elsewhere, there is no charge to the user, even though it has cost both time and money.

Next I shall consider periodicals. Here, the universities and polytechnics are in a rather different position from most libraries, in that their holdings are multi-disciplinary, and a student in one subject will have access to the stock in many fringe areas. Thus, in our Polytechnic library, someone with an interest in biomedical engineering will have, under one roof, material on medicine, electronics, mechanics, materials science, etc. The main technology library alone holds some 1,200 titles, of which some 200 could fall into the biomedical field. Other libraries' holdings ranged from 84 relevant periodicals at Aberdeen, to 340 at Aston, with the remainder at round about the 200 mark.

The only way to find out whether we all hold the same material or whether we vary a lot would be to compile a union list for establishments which include schools of pharmacy. I think this could be an interesting exercise. The survey showed 85% of respondents in favour of such a venture, though one librarian thought it would be more sensible to press for increased comprehensiveness of the BL serials list.

With the advent of computers and word-processors in libraries, the compilation of a union list is no longer quite the daunting task it once was, and it is obviously a prerequisite for any resource-sharing scheme.

Any union list would need to have a built-in weighting system, showing which were the libraries of first or last resort for particular journal titles. Otherwise one library with more extensive holdings might receive an excessive number of requests simply because of the convenience of being able to write to only one place for a whole list of different items.

Everyone wants inter-library loans. There is a vast range of material available outside Boston Spa. Everyone is feeling the effects of financial cuts. A lot of people do at least pay lip-service to the concept of resource-sharing. But can we make it happen? And if so, how? Is formally organised liaison possible? If I mention some of the problems that appear to crop up in the small-scale survey of pharmacy education, perhaps we can discuss later whether these problems are general.

First and foremost in the university and polytechnic area, the question is whether biomedical material can be given special treatment without upsetting existing systems. The answer, unfortunately, would appear to be 'no'. Our libraries are geared, as far as finance and staff are concerned, to standard procedures for all subjects. At Brighton we have more leeway than most places, I suspect, but even we would be hard pressed to make special provision for pharmacy resources. The cuts demand streamlining, not diversifying of procedures.

One suggestion to which libraries were asked to respond was that if we all subscribed to the core journals in the pharmacy field, could we not get together and divide up the less vital periodicals between us, so that one library took one journal and another library something else? We would agree to provide other schools with photocopies from our journals, while we would receive photocopies from other libraries of items to which we no longer subscribed.

Difficulties arose here. Librarians had visions of irate academics no longer able to go straight to their favourite specialist journal on the shelf, and objecting to the delay in obtaining copies from elsewhere. One librarian quite rightly pointed out that what was a 'fringe' journal for pharmacy might well be a 'core' journal for another course. Some librarians simply cannot alter subscriptions without approval from academic staff. Others had already had to cut their current subscriptions to the core. However, no one said 'no' outright. Most opted for a tick in the 'perhaps' box.

Staffing aspects have to be considered. Some libraries would not be able to take on any more photocopying than they do already. Also, there is a seasonal consideration which does not really apply to other types of library. At Brighton, for example, we are under great pressure in November and December while final year students are researching their projects and dissertations. Inter-library loans for pharmacy, for example, range from 800 in November to 40 in August. The surge may coincide too closely for everyone to be able to cope.

How could costs be administered if we were to get a scheme off the ground? I asked for opinions on two possibilities. The first was a pre-paid voucher scheme. One library would have to undertake to act as an administrative centre for the printing, provision and redemption of the vouchers. Participating libraries would buy them for 5–10p each, one voucher to be valid for one sheet of copying. One would hope that each library would reach a reasonable balance between vouchers sent and vouchers received.

Alternatively, we could avoid any financial transactions by simply working on the principle of goodwill, and making sure that a balance was achieved for everyone between services rendered and services received. Opinions were divided. Quite a few said 'no' to the goodwill scheme. Most said 'yes' to a voucher scheme, but some did not want to get involved in the running of it because of the staff time required.

If biomedical libraries started to liaise in such schemes—especially where shorter items below a certain number of pages were concerned—would there be any effect on BL's unit costs? One librarian thought that to attempt to undercut BL was against everyone's interest, and that our efforts should be concentrated on improving the national inter-library loan system.

One claimed that BL was quicker and cheaper than any other source of supply. He thought that any savings from such a scheme would be outweighed by other costs. Another thought that we should not exacerbate BL's problems by trying to undercut them, as this might force them to become even more expensive.

I have mentioned a few possibilities. The limitations on the higher education front seem to fall roughly into four categories:

(1) financial arrangements—it is not always easy to separate off one subject or field for special treatment within a large multi-disciplinary library;
(2) administrative arrangements—in a great many libraries, the organisation is by function, not by subject, so there is no one person sufficiently involved or with a sufficiently free hand to get the scheme off the ground;
(3) staffing arrangements—many libraries foresee difficulties in making staff available to provide a fast, reliable service at all times. Services would have to be limited. It might be difficult, too, to find staff time for the regular updating of a union list;
(4) the cuts—at present no higher education establishment is sure of its fate. In the pharmacy field alone there is talk of a 25% cut in student intake, and the complete closure of one or two schools. There is a natural reluctance to take on any long-term commitment for the time being.

One final point made by some of the librarians questioned. A scheme like the one proposed cannot really succeed unless all the specialist schools take part. It would tend to fizzle out. On the other hand, a balance would have to be drawn between comprehensiveness and unwieldiness, as too much pressure might equally cause a scheme to fail.

Resource sharing: a commercial point of view

D. S. Field

ICI Agricultural Division

Paper presented at the Aslib Biological and Agricultural Sciences Group Meeting, Aslib, London, 18 November 1981

I HOPE THAT my observations on the topic of the discussion appear relevant and stimulating. It may be that from what I have to say you will look on me as the 'Devil's Advocate'. I shall try to play the role with conviction. My aim is to be short, sharp and subjective (in an objective fashion).

Now, let me give you a caveat—my views are based on the situation in ICI Agricultural Division. These views may not concur, wholly or in part, with those of other Librarians and Information Managers in Divisions elsewhere in the Company—perhaps at this stage it would be sensible of me to point out that the ICI Divisions operate on a federal basis. Within this federation there is a number of formal links at many levels of administration. Overall, there are clearly identified patterns of commercial practice applicable to the whole group. However, because of their differences of history and development and, no less, their geographical separation, the Divisions do behave with a considerable degree of autonomy. Indeed, this autonomy is intrinsic to the Board and management of each Division. This allows the maintenance of a style peculiar to any one unit. Although I have alluded to autonomy in Board and management operations, autonomy also exists at the level of Division Information Units and Libraries. As I said before, there are formal links and such links do exist within the ICI group information network. This means that elected or appointed committees maintain a watching brief on the development and application of information and library systems and resources. Also, within this network there is a great number of informal links and contacts that promptly and easily facilitate the lending, borrowing or donation of resources on an *ad hoc* basis.

I shall now return to the text of my message—ICI Agricultural Division, like any commercial enterprise, exists to make profits. Currently its operations are profitable. This means that it can afford to invest in services with which to support its business activities. Nonetheless, there are very real and increasing budgetary constraints. Within these constraints I spend well but wisely. I try to make the Library operate efficiently. Therefore from my point of view I invest in books, journals, newspapers and data systems acrosss a wide as possible range of the Division's technical, commercial and legal interests—of course, this attitude is symptomatic of the autonomy associated with an individual Division. Librarians in other ICI Divisions will pursue their library policies according to local management and financial restraints—for the time being my policy will be that of buying, not sharing resources. As long as it is feasible and

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economic to do so I shall continue to buy. I wish to see the Agricultural Division Library and Information Unit being, as far as possible, independent and self-reliant.

Primarily, this independence relates to providing as much information as possible from in-house resources. Rapid response to requests for data, hard copy and reference material is of great importance to a commercial organisation operating in a competitive environment. The more resources I have on the spot the less time used in locating, recovering and supplying required material—reasonably, I may use the catch-phrase 'time is money'.

However, I cannot carry this philosophy of self-reliance to extremes. Whilst there are many excellent published works and information systems that I should like to have in the Library, I have to balance my needs and desires within economic and financial constraints. Therefore I do make considerable use of the services of BLLD and those of other commercial and non-commercial organisations.

In order to emphasise my theme of expenditure on resources versus greater use of shared or borrowed material, I have drawn a triangular 'model' (see Fig. 1 below)—I

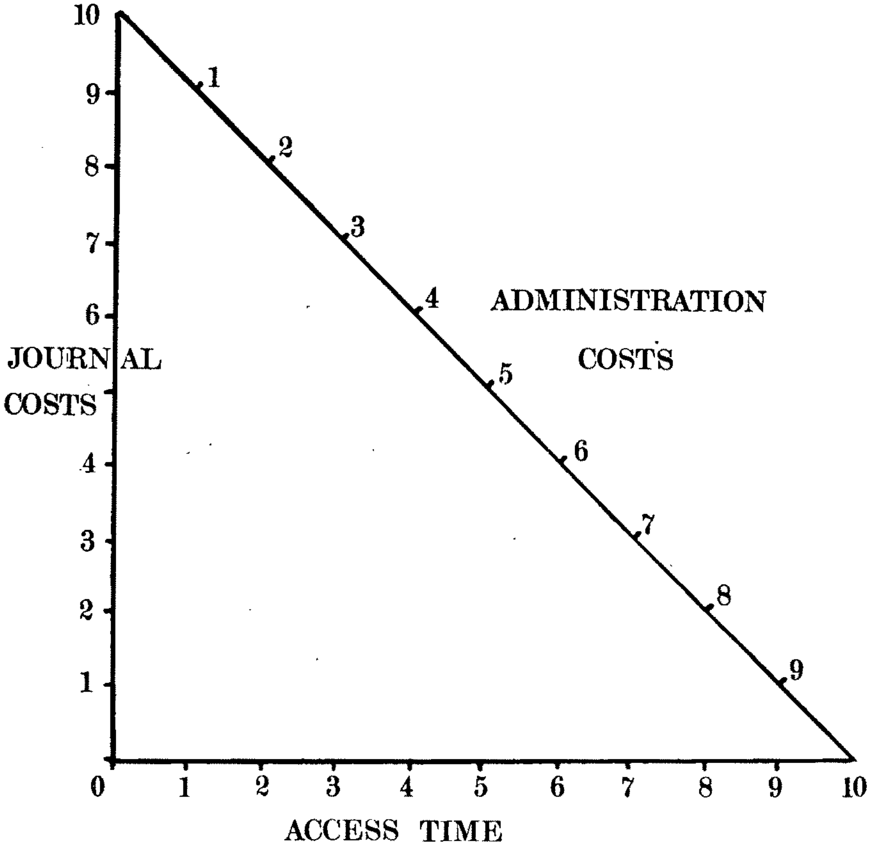

FIG. 1. *Comparison of journal administration factors*

should point out that this is a model of cost-benefit related to policy or strategy. It is not a model based on detailed financial analysis of information flow patterns, comparing captive with borrowed material. The model represents a pragmatic approach to information management.

Imagine that Agricultural Division is at the apex of the triangle, then by maximum investment in captive resources both response time to information demand and administration costs are kept to a minimum. If I reduce investment in my own resources then, as the diagram indicates, the administration costs increase and the response (or delay) time increases also.

I realise that some of you may say 'very simple, if you have the money spend it! Self-evident truth!'—Well, I did say that this model illustrated policy or strategy but it would be quite fair of me to make my point by momentarily considering the administration costs on the hypotenuse.

In recent years Agricultural Division Library and Information Unit has reduced its number of staff considerably. Therefore, it would be very difficult for the Library to move towards greater resource sharing, bearing in mind that resource sharing means a two-way operation/management system. I believe that related costs would rise and that in-house information services would be impaired.

After all, as Librarian, my duty is to meet the local demands for information and provide a good service from captive resources—to go for more resource sharing would represent a major change of policy, possibly jeopardising in-house services. Additionally I believe that my local management and Library users would not be very happy with a system that was devoting a considerable amount of effort to servicing external needs.

I think that I have stated my case clearly enough, so in closing I reiterate my opinion: within prevailing budgetary constraints I shall pursue the policy of purchasing my library needs, keeping resource sharing to a minimum.

Discussion

The talks were followed by a lively discussion. The main themes of the discussion were as follows:

The cost to an organization of running its own inter-library lending scheme was discussed in relation to the cost of using BLLD. In one small survey in the medical and life sciences field use of a personal, informal system rather than BLLD saved about one half of the previous costs. In such schemes use of staff time and expertise is essential. They appear cheap relative to BLLD because staff costs are not part of the library budget. This is the case in most public sector libraries. In commercial firms, on the other hand, staff costs are a very large part of their library budget. In such cases personal ILL schemes are not cost-effective and BLLD is preferred. The cost to an organization of running such schemes is reflected in the charge made to participating libraries. This could vary from no charge, to the cost of photocopying and postage and to the use of BLLD forms as currency. There appeared to be problems with all methods. Libraries could only afford not to charge while usage was low or there was equal usage between all the participating libraries. Though charging the cost of photocopying and postage would seem the obvious method this caused problems as many libraries had to use cumbersome and time-consuming invoicing procedures. Use of BLLD forms was resented as this did not result in any financial savings for participating libraries. BLLD felt that there was a case for both local co-operative systems and BLLD. As usage of BLLD increases their unit costs become more favourable. However if other resource networks developed to such an extent that BLLD requests decreased their unit costs would have to rise. And as usage of these other systems increased they would no longer be able to offer cheap or non-existent charges. The end result would be to the detriment of all concerned.

The problem of 'donor' libraries was discussed. In all ILL schemes there appeared to be one library that felt that it put more into the scheme than it took out and this could cause resentment. The library was often the largest one in the scheme. Good communication between participating libraries was essential so that such problems could be overcome. Possible solutions suggested were (a) a temporary moratorium on the usage of the library (b) such libraries should become libraries of last resort or (c) differential payment of libraries depending on degree of usage. The point was raised that the biggest cost to a library in operating an ILL scheme was the distance staff had to travel to get items off the shelf, to photocopy them and then to return them. In larger libraries this distance was greater and therefore they felt the burden more. Use of facsimile transmission was not a solution as it offered no savings either in staff time or 'postage' costs. A point was made that problems were caused by users consulting union lists and then visiting a library to consult the material *in situ*. Staff time had to be spent showing them how to use the library. Also if there were errors in the union list people could arrive expecting to find material that the library did not possess.

ICI made the point that in the commercial field time was the most important factor. Time was money. Therefore for such libraries the best use of their money was to purchase as much material as possible. If they had to use an outside library access time must be short, to reduce user complaints. In fact they were using a very specialized form of resource sharing—they were sharing BLLD's resources. But the point was made that often informal systems could provide a quicker access time than BLLD. In one case an informal system between local pharmaceutical companies was used solely for this purpose. Urgent items were requested from participating libraries by phone and either sent by post or collected. There was no charge. As the system was restricted to urgent requests it was not overloaded and worked very well.

The next step on from ILL, collaborative purchase, was discussed. This was very difficult to organize because of separate funding of libraries. There were many problems for multidisciplinary libraries. Perhaps this could be organized better by small, single subject libraries.

The point was made that there was more to resource sharing than ILL. The intellectual and expertise resources of library staff should be exploited more. Though the profession is divided into librarians and information scientists they are all in the information business. Information brokering should become a more important part of the profession.

Staff from SRL explained that in their case it was not a matter of resource sharing as SRL was a public library and therefore a resource that belonged to all libraries. SRL was an enormous resource that was still underused. It was important, in times of economic stringencies, for SRL staff to know what other libraries were depending on them to have. It was also essential for librarians to pressurise SRL into taking important materials that were missing from the collection. In SRL's case they were not only offering materials but staff expertise as well. Polytechnic libraries were also open to the public. In the case of Brighton Polytechnic resources were shared with local industry, county council employees and the NHS. This involved enquiry work as well as ILL. It appeared that natural links between libraries were not necessarily along organizational lines. Polytechnics are one example. The situation of Imperial College is another. Though part of the University of London, because of its subject interests its links were with organizations such as the Natural History Museum and the Commonwealth Institute of Entomology and with local commercial firms. Resource sharing, to be effective, must take such natural links into consideration.

The meeting concluded with the feeling that there should be more contact between co-operating groups throughout the country i.e. a co-operative of co-operatives. The aim of such contacts would be to share ideas and experience and to help people who wanted to start up their own schemes.

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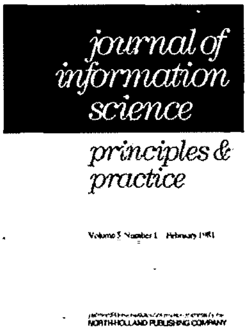
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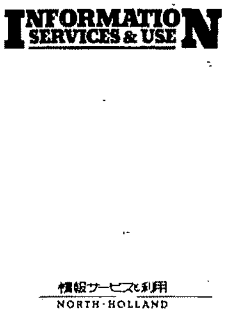

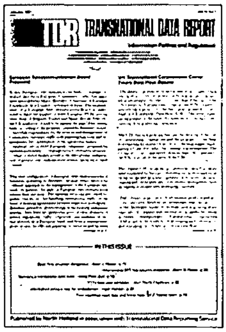

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Authors versus books

Anthony Smith

Director, British Film Institute

Summary of paper presented at the fifty-fourth Aslib Annual Conference, University of Oxford, 22–25 September 1981

THE SYSTEM OF moving letters devised by Johan Gutenberg established, or rather, confirmed a chain of specialist relationships which runs: author, printer, bookseller/publisher, reader, librarian. For five centuries these have been the principal actors in the politics of the text; they have fought one another and depended upon one another; they have been held together (or apart) by a body of law and professional doctrine. Printer, bookseller/publisher and their ancillary crafts and trades were all once firmly held within the Stationers' Company but as the printing press technology spread beyond guild control in the late 17th century these functions diverged more and more. We inherit the rituals and procedures of these separate professional groups and their relative status. They have seemed to us as inevitable as the seasons and as essentially *separate*. Not even those revolutionary prophets of the early twentieth century who predicted the withering away of the state considered that a technology might arrive, as suddenly but as profoundly needed as the printing press, which would lead us to question the settled assumptions of the renaissance. For that is what the new technology of the text urges us to do; at least, to dig out some of the unargued assumptions about the nature of authorship, say, compared with librarianship, about the relationship also between publisher and bookseller, publisher and librarian, and so forth.

An author represents a changing, an evolving body of data, often contradictory, often multi-disciplinary, often reacting to special but forgotten circumstances. Yet we habitually use the name of an author to identify portmanteaus of data and indeed to give a certain authority to whole areas of discourse or to particular perspectives on packets of data or areas of discourse. We speak of Marx or Milton Friedman or Kenneth Galbraith; we use the terms Picasso, Schoenberg or D. W. Griffith to designate blocks of cultural experience. Post-Renaissance, post-Gutenbergian civilisation is heavily oriented towards authors. We store our information and teach outlines of our societies' history in terms of individuals to an extent which is not really borne out by experience. We recognize the importance of 'borrowings' from writer to writer, and in the visual field from director to director but without removing the author from the central niche.

Both in the field of written literature and of the moving image we have begun to question the easy assumption that a text is the primary moral property and spiritual emanation of an author. We have started to demystify authorship, at least to the extent of stripping away the uninvited 19th century individualism which has recently

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shrouded it. Perhaps the moment is arriving when the concept will take several further knocks from the new text technologies which so firmly reconstruct the nature of information that they necessarily call in question the physical apparatus which has sustained the accepted inherited ideas concerning the constitution of the author and the nature of the book.

Every new communications system that has ever come into being has had the effect of re-structuring and displacing, usurping the settled functions of established institutions, disturbing religious beliefs and undermining the credibility of rituals. It is disturbing to live through an age in which the dominant information mode is being replaced, but that is where we are today.

An age of change is also an age of improvisation. It's a moment when principles become insecure. There appear to be about half a dozen distinct ways in which the computerization of information is transforming basic underlying principles which entered our society at the time of the Gutenbergian revolution, or even before it.

First, distance is rapidly disappearing as a factor in the cost of transporting text. Broad-band communication highways, involving satellites, coaxial cables and optic fibres all in interconnection are now quite rapidly reducing the distance element as factor in calculating the total cost of an information transaction. Thus, we may send words and figures from continent to continent as cheaply, or almost as cheaply, as from street to street. The same, of course, applies to information which is held in computer-storage or in digital form. Great blocks of data move about the globe awaiting use in whatever section of a network has parking room at a given moment. It is as hard to argue 'that's my data' as it is to look in the balance sheet of a bank and say 'that's my money'. Both cash and data are subject to electronic storage and lose physical existence until they reappear again in physical words.

The second changing principle is the Gutenbergian principle itself—the notion that the audience is reached by multiplying the physical number of copies of a text until the number equates with the number of people who can be identified as requiring the information. This idea is so obvious to us today that it's invisible. We live surrounded by the institutional implications of the idea, and yet it has become an extremely inconvenient one, an idea whose time has gone, rather than come. The technique of moving letters transformed the entire culture of the text and all the beliefs and assumptions which belonged to the manuscript era. Information could suddenly burst the bonds of time and of space, through the power of multiplication. Within a few decades the entire decomposing body of ancient texts were reproduced in printed form, transported to hundreds of centres. Erasmus proclaimed the 'library without walls', i.e. the phenomenon of infinite reproducibility of *identical* text. The Gutenbergian principle transformed the prevailing concept of knowledge itself, making it subject to constant augmentation through addition, comparison and controversy rather than subject to an overriding need for recovery and preservation. Knowledge was now felt to be something one did not but might have, rather than something which had been lost but might be found again. Knowledge exists somewhere between now and the future and we reach it by way of *authors* who sit at the centre of the text—apparently—who guarantee the text through the application of their names to it, who augment knowledge through the dextrous use of intellect and memory, playing upon the growing corpus of aggregative text. As the text multiplied it spread the author through time and space, it inflated him as the originating subject and the new legal systems began their few fascination with this more abstract form of property—information, which was henceforth subject both to organized censorship and organized protection, for it generated both fresh uncontrollable political power and fresh uncontrollable capital. Around the author sat publisher, printer, bookseller, all juridically dependent upon this intellectual apparatus, all bent upon exploiting it but regulating their economic circumstances through the support of the author and the glorification of the author.

It is this system which we may call the Gutenbergian, which is now coming to an end, at least in certain crucial respects. In information overload the system begins to meet its own internal contradictions. The principle, we begin to discover, in the second half of the twentieth century, functions efficiently only at a certain size of market and at a certain level of costs. The book, as a form, no longer works for all the categories of information which we cherish and, as a form, it is clearly attempting to perform functions which are beyond it. Let us take—only partly humorously—the example of the telephone directory which is a compendium of small nuggets of information only one or two of which are required by a given reader during the entire active lifetime of the text. It becomes increasingly expensive to accumulate, reproduce and distribute the information within the time of validity of the information itself. Their value has begun to erode the moment the ink is applied to the paper, or even before. And yet until now the telephone directory has operated within the Gutenbergian mode, the number of copies growing with the number of anticipated users. The idea has simply exhausted itself and is crying out for a return to the manuscript mode, the single copy of valid information from which the individual reader merely extracts the pieces of information which are required. Computer storage is clearly the only means by which the contradiction can be resolved. It is only a question of time—very little time—before the cost of the alternative mode drops below the rising costs of the exhausted mode.

The third and fourth principles need to be laid out side by side in order to explain them. Government is having to play a more central role in the new text technologies than in the traditional one. However, government is ceasing to play a role in the organization of audiences. Of course, governments have always been involved in directing the information flows of society and all governments are concerned to make laws which lay down certain boundaries for certain types of statement, even those which follow 18th century constitutions which proclaim rights of free expression and press freedom. Governments took some time to develop the idea that the more closely involved authority is with a given piece of information, the less credence it commands. For the most part governments take the path of caution and insist on controlling the industries of publishing and of education. However, there exist a few societies today, a small minority of the total, who choose to assert the separation of government from information as a matter of high principle, although even these tend to overlook the areas of continuing government involvement. A developing society faces a much more serious contradiction than an already developed one, since the former is having constantly to assert its own existence economically and politically, to press the world to see it as an independent entity in order that it can become an independent entity; thus, in the Third World, it is almost impossible for a government to open up the sphere of information to competition—only through control does it retain the semblance of its political integrity, even though that control undermines the intellectual development of the society itself. Developed societies, however, enjoy a much greater possibility of riding this contradiction. All of the new apparatus depends upon telecommunications and upon the controlling, reorganizing or dismantling of great areas of industry which make, maintain and distribute the equipment which constitutes the new systems of information. Government finds itself having either to legislate or to arbitrate between conflicting interests and principles; it has to determine what privacy means in the context of the new technologies, what constitutes a monopoly, how far a powerful controller of blocks of data should be permitted to monopolize the manipulation or processing of the resulting blocks of text. We appear to live in an age of transition, but the age could last for a very long time; the new text technologies will continue to arrive for many decades and we are really not discussing a temporary phenomenon but a permanent aspect of the information revolution. The age of telecommunications requires a special kind of stewardship on the part of bureaucracy, judiciary and executive, over the social condition of information. The ancient arguments about censorship are therefore not about to disappear in the age of information abundance, when the sheer plurality of means should, in the belief of some, simply overtake all problems of who should be permitted to say what. The arguments are in the process of being intensified. There can be no real guarantee of equal universal education unless children are taught to handle the new communication systems when they are taught to read. The problem is that the answers given in the past simply cannot be extended into the new conditions. There exists no agreement to that effect and probably will exist none. The whole range of problems have once again to be subjected to an era of debate and legislation.

While the state is shouldering greater responsibility for guaranteeing (indeed, creating) the new flows of information, the role of the state as an organizer of audiences appears to be coming to an end. It is an old function of the state, emerging from church and pulpit and later visible in the mandatory education system. What the state unconsciously accepted as its area of interest was the function of building the pattern of audience composition, as a means of regulating the medium concerned. Thus, Britain's broadcasting system developed alongside conscious and long debated choices concerning local versus national provision, popular versus highbrow; governmental judgements were made concerning the quantity of instructional material which should be offered and the amount of religious broadcasting. To this day government is involved in precisely the same area of judgement in connection with radio and television in Britain and so are governments in every part of the democratic world. Governmental intervention at this level of audience conceptualization and organization is the only means by which the media of broadcasting can be made to link to democratic institutions. In the 1980s and 1990s the technological choices made by governments and corporations are likely to lead to a general escape from the structures established in earlier decades.

Before returning more directly to our theme of authorship it is important to look more closely at the part played by the state in industrial societies within the flows of information, for there exist a number of unstated assumptions in the process. In absorbing the tasks of education and basic socialization into the work of government, societies took automatic decisions concerning the role of the vernacular, concerning the official status of religious teaching, concerning the career structures of industry and, therefore, the whole outlook of every individual. In taking on education so totally, government undertook the responsibility for the manufacture, so to speak, of adulthood itself, of defining the elements of social maturity and then of supplying them. Certain implied quantities of information are sufficient to transform childhood into adulthood. Such assumptions have continued to inhabit the later institutions which carried forward the fight from the mass education systems to the mass broadcasting and entertainment systems. the 'private' elements of national information systems have, to a very great extent, acted as the servicing agents of a state machinery. Publishing, for example, and music are to a great extent dependent upon the education and entertainment structures of a society, as are film production and distribution. The relationship between the 'author', who sits at one crucial point in the information flow, and the audience/society is clearly going to change significantly, as the new tendencies work their way through the institutions and supporting industries.

Now we come to the fifth of these basic principles of the information process which is today undergoing change. It's a rather difficult one to explain. We are used to information systems, certainly in Western Europe which are essentially national, unilingual, frequently uniconfessional, i.e. we're used to all the information to which we are subjected as individuals somehow belonging to *our* society, being addressed to us in our own language and very frequently in the light of one set of ethics or one set of religious principles which happen to be the dominant ones of our particular society. That indigeousness goes very deep, is inscribed very deeply in the prevailing notion of citizenship. We think of ourselves as citizens of a given society and thus as the receptable of certain quantities of information which have accepted those principles of uniconfessionality, unilinguality and uninationality. However, the age of computerized information and the new information systems, is a transnational age. There is no longer the possibility for sovereignty of knowledge, sovereignty of information being coterminus with the political sovereignty to which the individual citizen is subjected. We live in an age in which transnational corporations and international organizations are the main sources of information and the main distributors of it. And that is the end of another of those very settled principles that have belonged to the era of Gutenberg. Soon also the coming of automatic translation will deal another heavy blow—some time after the turn of the 21st century—to this identification of national sovereignty with information.

Those, therefore, are five ways in which the new information environment, the post-Gutenbergian age, differs from the inherited one. All of them are tendencies rather than absolutes, all of them were already evident in previous decades and are accelerated rather than created by the new technologies. All of the changes will play upon the role of the author and help to re-organize the functions performed by the author, as a concept, in society. The author as eponymous, self-standing being is an illusion necessary to the processes by which information was reproduced, stored, distributed.

Before the age of Gutenberg the problem was to preserve knowledge rather than to add to it. Those who had the most important role were those who preserved, essentially the librarians, those who protected and organized the information. In the modern post-Renaissance age another principle, that of the author became supreme. The machinery of information was under the titular control of the author. The librarian's techniques served the system which developed around the author as the central guarantor of the text. The computer age is beginning in many ways, some of them subtle, some of them quite dramatic, to unwind that concept of authorship. I

Performance measurement and information management

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Introduction: evaluation and performance measurement

EVALUATION IS A TERM which crops up with increasing regularity in the professional literature of our field. The term is easy to understand, but it does have a wide variety of applications. Evaluation studies can range from full-blown assessments of international information systems and referral services (e.g. AGRIS and INFOTERRA, respectively) to the evaluation of a particular service (e.g. a current awareness bulletin) in a specific organization. In this paper we shall be talking about *in situ* evaluation of services or systems which are 'up and running'. Evaluations of an experimental kind (e.g. the Cranfield indexing studies) or the evaluation of innovative developments (e.g. Prestel as a carrier of community information) will not be considered.

The purpose of evaluation is to relate performance to objectives. Every information service has a set of objectives, explicit or implicit. Evaluation really is nothing more than a form of 'self-audit' and should be seen as an integral part of the information manager's job. Perhaps performance measurement is a better phrase to describe what we are talking about; performance measurement being the process of systematically assessing effectiveness against a predetermined norm, standard or expressed goal.

Looking at the literature

Those interested in the idea of 'self-evaluation' may be dismayed by the wealth of literature on the subject. A useful entry point is John Blagden's book *Do we really need libraries?*[1], which contains a wide-ranging bibliography and much of general interest. Another recommended starting point is Lancaster and Cleverdon's *Evaluation and scientific management of libraries and information centres*[2]. Crudely speaking the literature on evaluation can be divided into two types: the scholarly/theoretical and the practical/case study. Much good work of the scholarly kind was completed during the 1960's and 1970's (e.g. Morse[3], Wessel[4], Orr[5], Wills and Oldman[6]), but there is little evidence that the methods and mathematics of this research effort have been applied at the operational level. Few practitioners seem to have the time or inclination to digest and implement the findings of bulky research reports (Margaret Slater[7] discusses reasons for this in a recent publication). The UNISIST *Guidelines for the evaluation of information systems and services*[8], though excellent in themselves, are more likely to be used by researchers and consultants than by practitioners. This may also be said of much of the research and survey procedure manuals currently available.

Moving away from the 'academic' literature there is no shortage of descriptive-analytic accounts of in-house investigations. Rennie McElroy's case history, reported

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in this issue of *Aslib Proceedings*, is a fine example of a multi-faceted evaluation exercise using a battery of well-tried techniques in the context of a pharmaceutical information service. The lesson to be learned from his account is that there exists a well-documented corpus of techniques and methods, which can be drawn upon by anyone who is sufficiently interested. It can of course be argued that much of the available literature on the subject suffers from either an excess or deficiency of sophistication, and yet there is much which combines good common sense with sound theoretical principles. Ching-chih Chen[9] has described a two-part workshop which coupled an introduction to the theory of evaluation with a delayed follow-up session in which the original participants related their experiences in applying evaluation techniques to real work situations. The practical experiences described include a study of monograph duplication, a cost-benefit analysis of a book detection system, a document exposure survey of three libraries and a case study of user demands in an industrial library. Also well worth mentioning is a brace of papers by Alan Blick[10-13], which could easily be used as models for intelligent in-house evaluation exercises. Unfortunately, being journal articles their impact on the profession has been less than might have been hoped. There is a case for considering how such material could be repackaged to bring it to a wider audience, since there is a real danger of reinventing the wheel as far as the literature on evaluation is concerned. The best course of action may therefore be to recycle existing material which has broad practical relevance. In fact, a kit has just been produced in the US (*User surveys and evaluation of library services*)[14] which more or less attempts to do this.

A 'Do-it-yourself' evaluation package

For some time the idea of developing a manual, set of guidelines, or a 'Do-it-yourself' evaluation package has been discussed at Aslib. With the support of the British Library Research and Development Department it was decided that the idea should be floated among practitioners to see what the general reaction would be, and, if it were positive, what the elements or ingredients of such a package might be. A checklist of candidate tasks and operations was drawn up in advance, the idea being that interviewees would react to the portfolio of suggestions, and that in due course some sort of consensus would emerge as to the kinds of areas and aspects which could most profitably be investigated at the general level. The checklist is reproduced below.

Current awareness services:
    —response/take-up rate (bulletins or SDI)
    —coverage (specificity-generality: department-user group)
    —size, frequency etc.
    —features (indexes etc.)
    —in-house vs. external services

Information retrieval services:
    —in-house vs. external services
    —coverage and depth
    —response time
    —recall-precision ratios
    —database comparisons.

Document delivery:
- —retention policy for journals
- —document collection vs. ILL
- —speed of delivery

Miscellaneous:
- —estimating in-unit stock use
- —journal binding policy
- —failure survey analysis
- —unobtrusive reference testing
- —cost-benefit assessment

FIG.1 *Candidates for self-evaluation package*

Practitioner attitudes to performance measurement

It may be a sign of the times or it may simply have to do with the subject area of our investigation, but it proved considerably more difficult than expected to recruit a sample of information managers who were interested and willing to discuss the question of in-house evaluation or performance measurement. We mention this point because there is a feeling in some circles that it is becoming progressively more difficult to enlist practitioner cooperation in certain types of research projects. In a sense this may be because of developing resistance to the constant requests from researchers for time and information, but a more plausible explanation may be that in the present hostile climate the 'average' practitioner (and remember, in special libraries the average number of professional staff is of the order of 2 or 3) does not have the time (a) to take part in 'extra-curricular' activities and (b) is not in a position to undertake evaluation studies, even if persuaded of the worthwhileness of such activities. (See: Slater, M. *Ratios of staff to users.* London: Aslib, 1981, p. 30).

Originally our intention had been to carry out a preliminary series of 20 on-site interviews (directed conversations might be a better expression) which would point us in a particular direction. We would then have attempted to produce one or two prototype guidelines, piloted these with the help of friendly practitioners and finally considered the suitability of our guidelines in the light of feedback comments. As it happened, we managed to arrange only 10 interview sessions and conclusions and recommendations for follow-up work did not emerge with the hoped-for decisiveness. Further, the suspicion remains that even with a larger pool similar general feelings would have emerged. At least this is our considered opinion, based partly on subsequent discussions with practitioners from a variety of library-information backgrounds.

Basically, three positions or attitude sets can be identified. First there are those who fly by the seat of their pants; those, in other words, who do not see the relevance of evaluation research and whose management style is inspirational rather than reflective. It would be an exaggeration to say that this group is in any meaningful sense hostile to the principle of evaluation *per se*, but it tends to be input-oriented and does not always appreciate the relationship between performance assessment and resourceful information management.

The second group seems prepared to accept that evaluation is a good thing in principle, but as a rule does not become actively involved, due to a variety of constraints and pressures, real or imagined.

Group number three consists of those who are themselves exponents of the art of in-house evaluation, or who would actively and positively consider applying basic evaluative techniques to the management of their services. Among these are those who have taken the trouble to look at the available literature, who have piloted techniques devised by others, or have themselves pioneered particular approaches. In the main, those who evince a committed attitude and a predisposition to critical self-evaluation are to be found in the larger information units, where there is a greater likelihood of established record keeping routines (without certain basic types of data/statistics it is effectively impossible to evaluate) and where, arguably, there is a greater emphasis on decision-based as opposed to intuitive management styles. It was with this group that interest in the concept of a self-evaluation kit was highest. It came as no surprise that certain individuals expressed a willingness to experiment with whatever prototype might eventually be designed. One senior information manager made the point that even if the present generation of practitioners was unreceptive, there was a case for trying to produce something which could be used in the training of the next generation of information personnel.

The interviews were conducted without the aid of a structured interview schedule but followed a definite pattern: (i) an outline of the project's aims; (ii) a summary outline by the interviewee of the principal features of his/her service; (iii) a consideration of the various items on the checklist with particular reference to the interviewee's own work setting; and (iv) a free-ranging exchange of ideas on the scope for, and practicality of, in-house evaluation programmes generally.

Even allowing for the smallness of the sample it was surprising how little emerged by way of consensus. There was little inclination to rank order the checklist items in terms of perceived importance or relevance. Individuals tended to react to the checklist by focussing on those aspects which corresponded to their current preoccupations, or reflected the particular orientation and character of the service they offered, and were relatively uninterested in looking beyond their own patch.

Evaluation as applied common sense

Evaluation can either be a one-time-only or continuous activity. An example of the former would be an assessment of the comparative costs and utility of commercially produced SDI's as against current awareness notifications produced in-house by scanning selected journals and reports. In this case a decision would be made one way or the other on the basis of a considered evaluation of the costs and benefits generated by the alternatives. An example of the latter activity would be the maintenance of a running record of search tools/databases used in the course of the working year with a log of 'hit' rates for each service used. In this instance the aim is to have statistics to hand which provide the performance-conscious manager with continuous management information in respect of a particular facet of the service on offer, and reveal variations in patterns of usage over time. In both instances decisions can only be made by first instituting some basic data collection procedures. In the former, data are collected only until an intelligent appraisal of the situation can be made. In the latter, the data collection process eventually becomes an established housekeeping routine. Even among those favourably disposed to the development of more critical approaches to systems monitoring and evaluation we detected a fear that whatever benefits evaluation might bring, the cost, in terms of the extra work involved (setting up and reviewing the data collection mechanisms), would be greater.

Even in the smallest information unit the spirit of evaluation should be encouraged. As a rule of thumb, if the use of a system is low then the input effort should be restrained. Yet, Aslib's experience [15] suggests that in many small units the concentration of effort is still on the creation of records (inputting) rather than the distribution and dissemination of information (outputting). If a particular file (manual or machine-based) is likely to be used but once or twice a week, and consists of essentially ephemeral information, then (at the risk of stating the obvious) there would appear to be little justification for developing a unique faceted classification for retrieval purposes. Perhaps evaluation should be thought of in terms of applied common sense. Evaluation is as much a way of looking at things as a body of techniques and tools. The problem lies in trying to persuade people that the traditional way of dealing with a particular situation or providing a particular service may not necessarily be the most cost-effective. The information manager who is unsure where to start his/her self-evaluation programme could do worse than begin by drawing up a list of the services and activities performed by his/her unit in descending order of the cost of providing them, and then looking at the return on the investment for each.

Evaluation and the user

Our checklist was broken into four sections: (i) current awareness; (ii) information retrieval; (iii) document delivery and (iv) miscellaneous. When each of the items is looked at closely it soon becomes clear that in certain cases it would only be possible to carry out a proper evaluation exercise by enlisting the cooperation of the user population. When an assessment of a service (or a number of competing services) is to be undertaken then clearly the opinions of those who use the service, or for whom the service is intended, should be taken into account. This is the point at which the user study and the evaluation exercise blurr. There may be problems with surveying end-user reactions, but two recent Sheffield manuals[16] [17] contain highly flexible and adaptable data collection instruments for assessing information needs.

The direct approach, however, is not always necessary. In considering the information needs of a particular client group it should be possible to evaluate the service delivery options by relating each to (a) what is already known about the user group in question and (b) a range of significant quality/performance indicators (e.g. cost, currency, coverage, relevance, usability). This approach may be subjective, but at least it is subjectivity of an ordered kind. Few evaluation studies can be conducted without at some time the views and requirements of the end-user being taken into account. For obvious reasons this means that most evaluation studies are of the one-time-only variety (and many of these are carried out by outside 'experts' rather than by in-house staff). Users will not want to be bombarded with questionnaires or pestered by interviewers unless the process is vitally necessary and of manifest relevance to their needs. The major user study (a blown-up snapshot of how things are at a given moment) is not therefore likely to be an annual event. That said, there are still a number of areas ripe for investigation, for which user participation is not a prerequisite.

A systematic comparison of coverage, currency and cost between databases covering similar subject fields is a case in point. Here, all that is required is an objective measure of the extent to which two, or more, services overlap or undercut one another. No doubt, information managers have certain feelings as to the respective merits and demerits of the major databases covering their particular subject field, but an evaluation-conscious manager would want to test his/her intuitions by running a simple experimental comparison of the relevant databases, particularly if the volume of online use were high.

Evaluation exercises cannot be carried out in a vacuum; each must take account of the special features and conditions of the organizational environment in which the study is carried out. A case in point might be whether to subscribe to a large number of journals (costly, but high on convenience for the users), take out a subscription to, say, *Current Contents* (cheap, but titles only) or subscribe to a select range of secondary services with reliance as necessary on a back-up document supply service (loss of currency). The important factor is that the information manager should be aware of the options available and be prepared to evaluate them critically in relation to the known (or, failing that, the assumed) needs of his/her users.

Areas for evaluation

As indicated, the reaction of the interviewees to the checklist was slightly disappointing. Nonetheless, it is probably fair to say that the question of balance between self-sufficiency and dependence on bought-in services, whether for current awareness purposes or long-term retrospective searching, is one which affects all information managers, to a greater or lesser extent. It is doubtful whether any of the other items in our portfolio have the same broad applicability and relevance. Some have minimal relevance as far as the world of special libraries is concerned while others have already been comprehensively covered in the literature. Yet others are (or may soon be) areas for investigation by the Centre for Library and Information Management (CLAIM), which recently launched its '*Aids to library administration*' series[18].

As far as individual database comparisons are concerned, this area has been thoroughly covered and reported in journals such as *Database* and *Online*. Numerous searches have been run on competing/overlapping databases to assess the strengths and weaknesses of the major commercial systems. These evaluations have been carried out by practitioners (and researchers) with considerable online expertise and have employed established performance measures (e.g. recall-precision ratios, cost-per-item retrieved, quality of descriptors, selectivity of coverage etc.). There would, therefore, seem to be little sense in attempting to produce a set of guidelines when professionally conducted evaluation reports are publicly available. Ideally, it would be useful if the existing literature on database testing could be collated (and regularly updated) and made more widely accessible. However, an evaluation model does exist and there seems little reason to duplicate the effort.

Although evaluation is (or should be) of interest to all those working in information management, not all evaluation exercises are appropriate to all information contexts. For example, monograph collections in special libraries and information units tend to be a relatively minor aspect of the services and facilities on offer. In a large research or academic library, on the other hand, the book stock is central to the service. The matter of estimating in-unit stock use is thus an important concern for libraries with large acquisitions budgets. Studies such as Colin Harris's *The subject intensity of library use*[19] or the controversial Pittsburg study[20] are important evaluation exercises designed to provide management with meaningful cost-effectiveness indicators, but they would be somewhat inappropriate in the scaled-down world of the special library-information unit. On this, at least, our panel was unanimous. Similarly, the 'invisible eye' approach pioneered by Tom Childers[21] in the US (unobtrusive reference testing, as it is often called) was felt to be 'politically' unsuitable, despite its undeniable usefulness.

One topic which elicited considerable interest was failure analysis. The technique has been employed in the public and academic library worlds in an effort to throw light on those factors which resulted in library users leaving the library without their so-called information needs having been satisfied. With a large, floating and essentially anonymous population, such as that served by the public library, this approach may well prove to be illuminating, but there might be problems in trying to apply it formally in industrial or commercial contexts.

A number of those we spoke to were convinced of the importance of regular client feedback, but equally were convinced that in dealing with what in effect is a closed/captive user community the best means of achieving this was through the development of close informal working contacts. In theory the idea of asking users to scan computer print-outs of online searches and indicate the relative usefulness of the listed references might furnish useful data for the conscientious information manager, but it is doubtful whether the desired level of user cooperation could be achieved and maintained to make the practice viable.

The very fact that special libraries are 'special' means that the Document Delivery Test (DDT) devised by Richard Orr[22], and subsequently employed by others, including Tom Wilson[23], cannot really be used to full effect. The DDT is a means of measuring the time required to make a specific item (or set of items) available to a hypothetical user, but the technique requires a set of comparative measures (i.e. performance figures for a network or cluster of broadly comparable library-information units) if the findings are to be of real value. For this reason, and also because of the effort involved in applying the technique, its suitability for the special sector may be restricted.

At the beginning of this short review we referred to the fact that at the back of many information managers' minds was the fear that any attempt at self-evaluation would, inevitably, lead to an unacceptable increase in the existing workload. This fear was most openly expressed when the idea of keeping a continuous record of information searches was discussed. One of the monitoring procedures instituted by Alan Blick is an edge-notched card file (it could just as readily be a microcomputer-based inventory) which records the salient details of all subject searches carried out by staff of the information unit. The cards contain a list of the major search tools used (hard copy and online) and are so designed that information on the number of tools used and the success rate for each can quickly be established. Amongst other things this allows the unit manager to relate the use made of the various tools to the cost of subscribing to them. Over the course of a year it is quite a simple matter to construct a league-table of cost-effectiveness for major secondary services and reference materials. Though all of those we spoke to commented favourably on the practice, the dominant feeling was that too much record keeping was required to verify what many felt they already knew instinctively.

When discussion switched from cost-effectiveness to cost-benefit analysis there was a noticeable shift in attitude. Cost-effectiveness evaluation, whatever the difficulties it entails, is at least based on empirical observation and measurement. Cost-benefit analysis, by contrast, opens the door to speculation and in so doing engenders an element of distrust. Some practitioners, understandably, are too tied up with the day-to-day running of their services to sit back and contemplate the wider issue of the actual benefits derived by the users of their service. Reliance on the classic output measures (e.g. volume throughput) is easy to criticise, but very often there is little else, despite attempts to develop more sensitive measures (e.g. the item-use-day[24], or the concept of exposure time[25] and, more recently, John Martyn's[26] notion of perceived benefit/value). The difficulty of trying to quantify benefit is one which is unlikely to be solved in the near future. The beneficial effect of information is readily acknowledged by most people, but the cognitive enrichment (to use Blagden's[27] phrase) which it brings about is impossibly difficult to measure.

Conclusions

There was little support for the development of guidelines relating to specific items in the checklist. The reasons for this were: unsuitability of the proposed technique in the context of special libraries; lack of perceived relevance of a particular approach; the existence of adequate (potential) guidelines at present. However, the question of choosing between an in-house database and reliance on external suppliers was seen as an issue of general significance. The information manager has to review the options open to him/her, consider the costs and likely savings involved and give some thought to the effects of settling on a particular course of action as far as the users are concerned. This process, as Blick has illustrated in his paper, *Evaluating in-house or bought-in services*[28], can be reasonably systematized without the user population having to be consulted, or, indeed, in any way directly involved. Blick's approach is built around a simple matrix which allows the competing options/services to be rated, subjectively, in relation to a number of predetermined criteria. The steps involved are clear and simple, and the whole process could usefully be tried in a wide variety of information settings.

The tools necessary for performance measurement do exist. The only drawback is that they are scattered throughout the professional literature. Even allowing for this, it seems to us that the relative failure to utilize these tools has less to do with their dispersal in the primary literature than with lack of practitioner interest in applying them to 'live' situations. Support for this view comes, interestingly, from a study by Jean Bird[29] of effectiveness assessment in the public library domain. In the conclusion to her report she deliberately makes no recommendations for further investigative work, arguing that '(T)he desire to know about the effect of library performance has to come from the practising professional if the information collected is to be believed and acted upon'. Perhaps the only real solution, albeit a long-term one, is, as Norman Roberts has suggested[30], to bias the curricula of the schools of librarianship and information science towards (amongst other things) evaluation. In the short-term maybe what is needed is for someone to attempt to bring together, possibly in edited form, the best of the currently available literature in a 'user-friendly' package which would encourage its widespread adoption.

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Managing multisite polytechnic library services

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Introduction

IT HAS BEEN widely assumed for the past ten years that multisite libraries, a feature of polytechnic institutions in the U.K., are expensive to operate, difficult to administer and by implication that the services offered are limited. Some years back, Wilfred Ashworth wrote an authoritative article[1] covering most of the major administrative problems of multisite library systems and much of what he said still has considerable relevance. But given the increasing pressures resulting from the stringent financial climate and the continuing diversification of polytechnics, it is worth re-examining some of the management problems associated with multisite library services in polytechnics. My observations are based on numerous conversations with colleagues in other polytechnics and as such have no particular reference to any one library service.

Almost all the polytechnics have remained in a state of organizational flux for much of the decade with various degrees of rationalization occurring as a result of mergers and more recently retrenchment to fewer sites to reduce overheads. In responding to these developments libraries have been faced with many changes in buildings with the inevitable stock transfers and regrouping of staff. It is not surprising therefore that no consensus has emerged on acceptable levels of service. Librarians have been faced constantly with the prospect of contingency planning so that any vision of the 'normal' is always beyond the horizon. This is further aggravated by the fact that most polytechnics have developed into very diverse institutions in terms of their academic activity ranging from high level research in science and technology to short courses where the customer now expects a high degree of satisfaction in return for his money. In such circumstances it is understandable that the standards of service offered vary considerably and I suspect that even within most sites the quality of service to the respective groups of users varies quite a lot.

The library manager in this context is faced with a rather daunting task. During the seventies most library managers approached these problems with one of two basic thoughts in the back of their minds. Some struggled on in the belief that they would eventually obtain a central library thus providing a panacea for all the current problems. The others relied on the 'management of growth' syndrome in which plans for better services were based on the assumption that more resources would be forthcoming and indeed some librarians were very successful in pursuing this strategy.

The present situation

The situation has now changed significantly and for most polytechnics neither of these two premises remain valid. Capital spending has dried up so that any major plans for further centralization have been halted at least in the short term. On the other hand those with multisite libraries are not immune to the current cost-cutting exercise and yet they find themselves under pressure to offer a better and wider range of services. There are however remarkable differences in the levels of resourcing for polytechnic libraries. This is understandable if one considers the various combinations of historical accidents that produced the multisite systems together with the idiosyncracies of present funding arrangements. But libraries like the polytechnics as a whole have grown inspite of these factors and their expectations have been largely moulded by the resources available during this time of critical development. This produces the ironic situation where some polytechnics with a relatively high level of resourcing protest loudly that their services are close to collapse when even the most cursory analysis shows that they are, even in their reduced circumstances, much better resourced than many other similar polytechnic library systems. This is not to say that the internal struggle in such circumstances is in any sense less real. The psychology governing present practices and future expectations is governed by what has gone before and it is only natural that fears be expressed in a vociferous fashion. But the current position merely illustrates that we still have little idea of how much it should cost to operate an effective service for polytechnic libraries whether they be central or multisite.

With the threat of new funding arrangements looming in polytechnics, the librarians have been keenly weighing up the prospects of survival under a unit cost system, whether operating at a local or a national level, and whilst several librarians have been preparing local data there is little sign of agreement on even the most basic provision. In fact whilst multisite systems should in theory cost more there is still no evidence that they actually do so. There is no recognizable relationship between the number of staff in each polytechnic library system and the number of sites. Whether or not, with the inevitable spread of resources in the multisite services, there is an inferior service is a different point and this would be even more difficult to prove. It eventually leads back to the question of cost effectiveness. I do not intend to devote time to a discussion of methodologies for assessing cost effectiveness as this is a subject in itself, but I think little progress has been made in this area simply because our concepts of acceptable levels of service still suffer from a lack of clarity. All we can say at the moment is that a good or bad service can be more readily detected from library to library in a multisite system than in a large centralized service where deficiencies may pass unnoticed. Our inability to reach any consensus on this question of costs in relation to service may yet prove the downfall of polytechnic libraries as they become entangled in the unit cost net.

Styles of management

Whether or not the manager of a multisite library system is faced with worse problems than colleagues in more unified systems is open to question but there appear to be some characteristics which remain distinctive. At the broadest level the overall style of management to be adopted in the face of increased adversity is an issue which preoccupies all polytechnic librarians. There is an increasing tendency to be more interested in the theory of management at the level of broad strategy and this probably reflects a search for a more meaningful response to the current stresses. Wilfred Ashworth explored at some length the possibility of applying the 'organic' system of management as advocated by Burns and Stalker to a multisite library system.[2] It was a positive attempt to find a solution to the key problem of how to cultivate a corporate image in a situation where the sites are diverse both in their resources and service requirements. The appeal of the Burns and Stalker approach is that it appears to allow scope for a balance between the demands of central direction as against the necessity for a considerable degree of autonomy at the local level. It is acknowledged that there are no particular rules governing this type of management system. The organic system is best signified by a series of 'characteristics' all of which encourage the development of a style of management or a 'common culture' in which local decision making can flourish in the absence of central bureaucracy. There is no doubt that Ashworth correctly identified the crucial management problems in a multisite library system and this particular management style still appears attractive. But it is not without its problems, particularly at a time when the corporate approach shows signs of fragmenting as sites begin to struggle against each other for an increased share of diminishing resources.

The most severe criticism of this particular management theory is that it is merely a recipe for 'sitting back and doing nothing'. In other words that local autonomy continues to be the dominant element with the patterns of service remaining very much in the same pattern as before. Whilst many site libraries offer excellent services most librarians managing multisite systems admit to having some site librarians who struggle to offer acceptable levels of service either because of the personalities involved or because the resources available are simply inadequate to meet the demands of the user community. If the organic approach is to be successful it will be dependent on cultivating the relevant favourable characteristics upon which service concepts can develop. But it is not at all clear how these characteristics are best promoted. They appear to be based on attitudinal factors rather than rules, so it is safe to assume that any such system will only develop over a considerable length of time. The role of the chief in this context is probably of the utmost importance. The most likely way of making this theory work would be to adopt a participatory management style involving all the site librarians as this may lead to some concensus on acceptable service goals. There are certain advantages in adopting this particular strategy. Participatory management has been a fashionable concept for the past few years and it is generally welcomed by staff at all levels. But it is not without its limitations. In systems where autonomy has been almost complete and where the inequities of resources at the local level have persisted over the years the task of moulding a participative management team is not easily achieved. The tendency is for site librarians to view most discussions on matters of general policy through the eyes of their own particular experience and requirements. This seems to me to be a perfectly natural response and if the organic approach is to work there has to be a proper balance between the corporate approach and the self interest of particular sites. In order to do this it is essential to identify those elements which are capable of being decided corporately and which apply to all sites within the service. These may turn out to be fewer than the enthusiasts for corporate decision making would like, but unless they are identified there is scope for continuing dissension within the management of a service.

Allocation of resources

The allocation of resources is always a dominant element in any organisation but it has heightened significance in a multisite library system at a time of diminishing input. It is becoming clearer in polytechnic management as a whole that the democratic committee structure has serious deficiences in the current climate. Whilst resources were expanding it proved reasonably satisfactory because there was always a little more for every body so no one group had to suffer at the expense of others. There appears to be a swing back to smaller groups at the executive level taking real responsibility for the strategic allocation of resources, and then allowing full responsibility to groups to plan expenditure within the constraints of their own particular budget. Library systems are a microcosm of this wider trend, and it may be that the library manager will have to take increasing responsibility for strategic decisions on the allocation of resources which will cut across the consensus formula oriented approach of the past few years. But in doing so, there is the risk of alienating some site librarians together with the schools or departments which they serve. There appears to be no easy solution to this dilemma. Certainly there is a need for better management information on the relationships between inputs and outputs. Most librarians have no systematic approach to the gathering and analysis of information other than the rudimentary quantitative statistics on book loans. The problem is exacerbated because most multisite libraries reflect the fact that inputs in terms of resources very often bear little or no relation to outputs in service terms. So much is dependent on personalities and this factor is difficult to reconcile with the public aspects of policy making for resource allocation. The librarian will be dependent on solid support from somewhere within the system other than site librarians and this requires an astute appraisal of local political circumstances. I say this because the differences in the political relationship of the library to the rest of the polytechnic government varies enormously already. In some polytechnics the library committee plays a dominant role in forwarding proposals to a high level whilst in others the librarian has a relatively free hand with no library committee and in these circumstances tends to work discreetly through other major committees or simply through the executive structure. Existing patterns cannot be easily reversed, but it is certain that in a multisite system the librarian must pay very close attention to this matter with a view to creating a position where shifts in resource allocation can be achieved outside the formula syndrome which so often merely props up the inefficient and hinders the more positive elements.

Rationalization of systems

Because most polytechnic multisite systems were formed out of an amalgamation of a variety of different types of colleges, the libraries naturally reflected a wide array of customs and practices. There has been great emphasis on rationalizing systems partly in the belief that it would provide a unifying force within the system as a whole, partly because it would reduce glaring inefficiencies in the existing systems and partly because computerised systems demanded a commonality of approach. All these factors have played their role in encouraging a consensus view and it has appeared to be a legitimate and profitable exercise.

Whilst all three factors remain relevant they are not quite as important as they were five to ten years ago, either in terms of circulation systems or cataloguing. The principal thrust behind rationalizing circulation systems was threefold. It was widely assumed that users in a multisite system would access any service point within the network and it was therefore important that both the loan policy and the actual systems were similar for ease of use and administrative convenience. The commonsense of this view has remained unchallenged, and rightly, since some issue systems were thoroughly inefficient and the rationalization forced site librarians to think more systematically about the parameters governing their own loan policy. But there are a few qualifications to this generally accepted view. In the first place there is not a great deal of evidence to support the premise that students or academics actually use more than one library even when they are in close proximity. It is a salutary fact that users do not, and will not, travel very far to use a library. This is not to say that they lack motivation but largely reflects the fact that many students have relatively high contact hours compared with their university counterparts so they have limited free time to visit libraries. There is also the paradox that they get to know their own particular library because of its smallness and intimacy and are reluctant to move to another small library which because of smallness exudes a similar air of intimacy and can be offputting to a stranger.

There is another more serious challenge to the conventional wisdom in terms of approach to loan policy. The traditional view has been that a uniform loan policy is in the best interests of the academic community as a whole. This was reinforced by the demands of the first phase of computer systems which were only capable of handling fairly simple parameters. But if one looks closely at the requirements of libraries within a multisite system, particularly those which are predominantly subject oriented, it is evident that demands can vary quite significantly, so it would seem logical that the laws governing supply and demand should vary accordingly. This view is reinforced by the fact that in multisite systems where central decisions dictate loan policy there are numerous examples of deviations at the local level to accommodate local needs. This of course could be interpreted as managerial weakness and it sometimes is, but it remains true that for example science students and social science students make use of a library in entirely different ways. Some of the second generation circulation systems allow considerable scope for individual libraries to set their own loan parameters within the overall limits of the system and it could be that site librarians should be encouraged to make maximum use of these facilities in response to local need. Whilst I do not wish to overstate this case it does seem that there may be scope for a swing away from the existing centralizing tendencies in formulating loan policies.

Some of the same factors may be relevant to the technical systems supporting the acquisition and cataloguing of library material. Almost all polytechnic libraries, multisite or otherwise decided to centralize these activities into technical services departments in the interests of efficiency. I have discussed this particular aspect at length in another article[3] where I have argued that the demands of the technical batch computer systems dictated this trend and that the benefits may not be as self evident as they seemed to those who created the systems. There can be no doubt that uniform cataloguing and classification have been beneficial to the transfer of stock between sites. But some doubt still persists on the efficiency, and perhaps the economy, of centralized departments which were very often created at the expense of site staffing levels. With online systems developing at an encouraging rate the day is not too distant when the possibility will exist for online input into cataloguing systems from individual sites. This will occur at a time when staffing levels are of vital importance at the site level and it will not be surprising if decentralization becomes fashionable once again. This is bound to have attractions to site librarians who seldom feel that they have any control or indeed say in the formulation of policy for technical services departments. But the present position may not change greatly because it will still be necessary to have a Technical Services Librarian or a Systems Librarian planning and controlling the system.

But it is at the site level that the major management problems still exist and any corporate approach still seems to have minimal effect on the way sites actually operate. As I have already mentioned the range and quality of services offered at site level can vary as much within one system as between systems. The most immediate cause of these disparities is the fact that within multisite services the units are inevitably small and this means that personalities become much more important in establishing and implementing service priorities. A site librarian has considerable autonomy and irrespective of the style or quality of central management this factor will continue to be the key element in formulating management strategies. Wilfred Ashworth observed that middle managers are often promoted beyond their competence as managers[4] and where this happens to a site librarian the obstacles to innovation and new service goals is considerable. For most of these site librarians there is little chance of being able to improve their position because they are frequently caught at a disadvantage when competing for more senior posts because their administrative responsibilities seem small compared with middle managers in centralized library systems. On the other hand they often have much more responsibility for liaison with academics than their counterparts in larger libraries. This in itself highlights the dilemma: site libraries may be smalltime and lack the glamour of centralized libraries, but if they fulfil their potential they can offer a most effective range of services based on the close proximity of their readers and greater attention to personal requirements.

Staff allocation

There has never been any agreement on how small a site library can be either in staffing or physical resources to offer effective services in higher education. This is becoming an increasing preoccupation as the squeeze on resources continues. If a number of sites are involved it is self evident that there is a base in staffing terms which must be retained if all the sites are to offer reasonable opening hours. With the growing interest in part time students, evening opening becomes essential so there is little scope for a drastic reduction in opening hours. Bearing this in mind it is likely that a minimum of four staff and possibly five is essential to operate at the most basic level. As there are many sites in polytechnics already operating at this basic level, any further reduction will demand a rethink in basic strategy. The obvious answer is to close a site and whilst some polytechnics are adopting this approach as general policy it would be exceedingly difficult for a library service to abandon a teaching site of its own accord.

This raises the general question of staffing within site libraries. At the moment there is no consistent pattern either in terms of the number, the grading or the level of staff. Historical patterns still predominate in a majority of these systems and it has proved difficult to rationalize numbers or to move staff, particularly where the geographic distances are great. There is a strong argument in favour of having the maximum number of professional staff in a small site because it ensures a level of professional competence at all times, and avoids the possibility of professional versus non-professional antipathy which can be intolerable in a small unit. On the other hand it means that there can be no job division and the routine work has to be shared between all staff. In most instances this does not appear to be a substantial problem which may seem surprising in these union-conscious days. The greatest danger seems to be the possibility of clerical work becoming the most influential factor and this can easily lead to professional concerns reaching the lowest common denominator. Libraries are no different in many respects to other office based organizations and efficiency in terms of neatness and tidiness can become an end in itself.

The other disadvantage of having a high professional element is that the staffing costs escalate at an alarming rate. Many polytechnics with multisite libraries have seen the ratio between staff and books drift dramatically in favour of staff with little chance of reversing the trend. It may be that there will have to be a much more imaginative use of professional members of staff in assisting readers and this may require a review of the present position where most professionals usually leave at the end of a normal office day. It appears that our American colleagues are now much more concerned with reducing unit costs for staffing and they have reinforced their long held custom of using students on a part time basis to look after issue counters. This may begin to have more attraction in polytechnics but there would have to be a reversal of a long standing resistance to the idea and equally there would be a need to overcome the inevitable resistance from union minded staff who would interpret such steps as an erosion of their own conditions of service. The continuing uncertainty on this question may be a reflection of a more basic problem associated with general service goals. Most librarians, when questioned, can quote their general objectives but there is little attempt to define priorities either in terms of services or in terms of the user groups being served. This is not surprising as the demands within a polytechnic library are so diverse. It can be argued that user demands make themselves felt to the extent that the library responds accordingly but I have always considered this a doubtful premise because libraries and librarians have a considerable capacity to govern the expectations of their potential clientele. A great deal of research has been devoted to studying user needs in recent years and whilst a lot of interesting detail has emerged from these studies they do little to assist librarians in planning services other than to make them aware that needs are diverse. It also seems that little progress has been made in distinguishing between demand and need, the one supposedly being a concrete expression of the other. There are now some attempts to shift the focus to study what users actually do with the information they receive and this may shed new light on this particular aspect. But we remain unsure as to what a customer oriented library should look like and initiatives are still very much dependent on particular personalities within the library staff.

Management of growth

Faced with what sometimes seems an intractable problem the library manager can easily fall into a relatively powerless position. Collective goals can be set and a consensus arrived at in general terms but this quite often fails to be translated into effective service at the local level. These feelings are exacerbated on all sides in times of retrenchment and the odds at least superficially seem weighted in favour of any site librarian wishing to retain the status quo.

This most commonly manifests itself through the familiar arguments employed during the management of growth syndrome. During most of this period new services or an extension of services were planned on the basis of acquiring further resources to develop them. Indeed this strategy was used at all political levels by librarians and it proved to be a fairly successful ploy. Site librarians still use this argument at a time when it is abundantly clear that new resources are not forthcoming. Any new services have to come out of existing resources and to achieve this there needs to be a realignment of priorities. But old habits die hard and there has to be a significant change in attitudes by managers and staff for progress to emerge. This is much harder to achieve in a multisite system because day to day pressures exert much more influence on thinking than in larger systems. It is difficult for site librarians even if they are so inclined, to discuss new services if the staff feel they are already under pressure. But equally some site librarians do protect their own practices by asserting that staff are already overworked when it is immediately obvious in many instances that they are not. This posture derives from the management of growth syndrome when it was always wise to ask for more of everything. Indeed there are signs of a reversal of this strategy in that middle managers will not now admit to the possibility of innovation or spare capacity in the fear that they might actually lose some of their existing resources. There is no easy way of escaping from this 'catch-22' situation.

It is unlikely that any general management theory will help the manager of a multisite library system to solve these problems. The sheer diversity of circumstances prevailing in each polytechnic would seem to preclude any common approach. I think there has been a tendency to run multisite systems as though they were or should be centralized and this may have been a mistake. On the other hand there are examples of a completely laissez faire approach and these too show signs of fragmentation under pressure with little hope of changing direction. There needs to be some general sense of purpose common to all sites even if it is merely at the psychological level to help foster and sustain new initiatives. Having said that the main thrust will be through individual libraries and therefore the relationship of the library manager with the site managers is of the utmost importance. I think a change of direction could arise out of the advances in new technology and I have outlined this in some detail elsewhere[5]. With the advent of online systems both for housekeeping operations and information systems it is now realistic to think of establishing a communications network in a multisite library system that will offset the worst aspects of present isolation and yet preserve the scope for local initiative. At one level the linking of all sites into an online circulation system has a symbolic effect which is quite independent of any actual value derived from the system. It would be almost impossible to justify the introduction of automated circulation systems in a small site library with a relatively low turnover of stock on cost grounds alone. Nor, I suspect, could it be justified on the grounds of inter-library loans from the rest of the system. But the network effect has a significant psychological effect because of the very fact that communication is possible over the system as a whole. I say this because the biggest disadvantage of small sites is that they become limited by their own physical environment. Academic libraries are still very much judged by the size and extent of their physical resources and are therefore substantially book oriented. In some respects I doubt that multisite libraries are at a disadvantage when compared with centralized systems. The available statistics on loans show little difference in overall loans when comparing central libraries with multisite systems. In one sense students actually obtain a better service with regard to basic texts in a multisite service because resources are partially protected for particular groups as against the open house approach in a centralized collection.

But the dependence on hardcopy is likely to diminish with the advances in new technology and the increasing complexity of information needs within a polytechnic community. If these developments continue it would seem wise to view sites within a system as information stations forming part of a communication network. The isolation of sites in such a framework would be minimized and they could make maximum use of their primary advantage, that of proximity to their users. There are those who see such developments as being far in the future but this may not be so. The rate of change is likely to speed up over the next five years and it is time now to plan ahead if we are to take advantage of new development.

There are of course many obstacles in the way of these developments. Already in larger systems resources can be specifically devoted to areas such as online searching and a small number of experts can be trained to service the library as a whole. For this to happen in a multisite, subject oriented system is difficult because it implies devoting a significantly larger amount of resources initially to the change in direction. This means that the strategic decision on priorities at the local level takes on even more importance and as yet few site librarians are prepared to take the risk. But I suspect times will change and it will become a matter of necessity in the battle for resources and ultimately in terms of self justification both to the users and professional colleagues. In the early stages the incentives have to be offered in terms of cash to those willing to experiment and this in itself requires a strategic decision on the part of the library manager in allocating resources. This is made all the more difficult in the current climate when there is insufficient money to buy basic texts but I think it would be shortsighted to shrink from the challenge.

I also think we can take added encouragement from the fact that the emphasis on information technology will lead to the library forging new links with teaching departments in joint ventures which will lead to additional resources being made available from teaching departments. There are already examples of this happening in some polytechnics and it is vital that the libraries be in the vanguard of this movement. The role of the chief will be crucial because he will need to be involved with key academics in departments at the political level in winning resources. This will probably be best achieved through informal contact and it should not be allowed to undermine the important role of the site librarian in the formal committee structure within each site.

Staff development

In creating a climate where change can occur, staffing policies and staff development will play an important role. In a multisite system there needs to be additional investment to overcome the professional isolation that is an inherent part of the system. There are several aspects to this problem. At one level it can seem a good idea to retain flexibility in the staffing structure so that staff move readily from site to site both to satisfy service objectives and to broaden the individual's experience. But whilst being a good idea in theory it seldom works very well in practice. This is partly because site librarians only wish to exchange staff on a temporary or permanent basis whom they feel to be dispensable and it is only natural that their colleagues in other sites find this unacceptable. It can also lead to a loss of corporate identity at the site level if practised on a large scale and this can cause more problems than it solves. On the whole it seems wise to cultivate effective teamwork at each site so that staff are both socially and professionally acceptable to each other. Harmony amongst a small group of staff is essential if there is to be a conducive atmosphere. There is a danger however in pursuing this policy too strongly because it can lead to a rather grey approach in choosing middle-of-the-road professionals who will be pleasant colleagues but lack drive in the professional sense. But given that the success is so dependent on a few staff at the site level this policy remains more appealing than that based on free exchange of staff.

A formal staff training and staff development programme can alleviate some of the worst features of multisite isolation. It has been fashionable to espouse the cause of staff development in polytechnics over recent years but very few library services devote anything more than minimal resources to such programmes. Apart from any commitment that libraries have to junior professional staff there seem to be ample reasons for mounting a strong internal staff development programme. The exchange of ideas across sites on both functional and general topics can lead to renewed self examination at the local level and a questioning of local practices. It also seems sensible to have internal members preparing the seminars because the very act of presenting ideas to professional colleagues has a stimulating effect and whilst the seminar might lack expertise and finesse the long range benefits are potentially greater than bringing in outside speakers on a regular basis. It implies an extra burden in terms of preparation time but it seems a necessary commitment if staff development is taken seriously. This is not to say that outside courses and conferences should be ignored but they should be regarded as complementing the internal programme.

Communication problems

If there is one factor that promotes a corporate image above all others it is communication in the widest sense of the word and ironically this has little to do with any one management style although some would say it is likely to be more successful in a participatory management context. Most library managers would admit to chronic failures in this area however well intentioned they have been in their attempts. This occurs because one is dealing with the whole range of human frailties and constant paradoxes present themselves. These are manifested in a most acute form in multisite systems because the natural human reaction is that 'it must all be happening elsewhere and they don't know about it'. Academic institutions thrive on rumour and counter rumour at the best of times and being multisited merely accentuates this tendency.

Having said that the basic paradox is that individual sites only want to hear certain information about other sites and quickly reach saturation point if fed with too much information. If any library manager could capture the essence of relevant communication he would be an instant success but this also never materializes. There is no doubt that each library manager has to conduct periodic self examination to assess the outcomes of efforts in this area. No easy remedy will ever be available because it is dependent to a large extent on the ability of senior line managers communicating with their own staff. If all line managers were able to do this the problem would not exist but for a whole variety of reasons many site librarians are highly selective in choosing the information they convey to staff as a result of management consultations at a senior level. This can be partly offset through written communication but the limitations of this form are considerable in that staff often fail to read memoranda. On the other hand it is quite difficult for a chief or his deputy to walk into a site and readily converse with junior staff on anything other than informal chat.

There is a constant problem for a chief in a multisite service in finding a balance between providing wholehearted support for site librarians irrespective of their strengths or weaknesses and being sufficiently accessible to staff at more junior levels. At the structural level it seems essential that site librarians be an integral part of the central management group both in terms of general policy and as the principal means of communication. Whether or not there should be a further layer of senior management either senior to or parallel to the site librarians is questionable. When the corporate management concept was at its height in the early to middle 1970's many library services did form central corporate management teams who were supposed to set the pace for the service as a whole. Success was limited and in fact many such teams have been subsequently abandoned. There were two main reasons for the demise of such teams. Firstly it was an expensive layer of management which loomed large on the balance sheets when economies had to be made. Secondly, and more importantly, they were only able to perform a limited function in their various activities without infringing on the autonomy of site librarians. In fact they were essentially advisory roles and most medium sized library services could not sustain a team of advisors without appearing top heavy. With the best will in the world they often became an obstacle in the decision making process between the chief and his deputy and the site librarians.

There may be a much stronger argument for having staff, in addition to site librarians, involved in management meetings. From time to time pressure builds up within any library service and consultative bodies are created either involving grades of staff or functional groups to examine management problems. Almost invariably they have a limited life because they can assume no real authority and once the immediate problem is solved they tend to lose their impetus. If there is to be a genuine participation then it probably means involving a limited number of staff at the senior management group. But all the flaws of truly democratic management reassert themselves. The larger the group the less chance of being able to reach any meaningful decision and there is the constant question of whether the next layer should be representative of groups of staff or representative of every site. It seems that every time this concept is seriously considered it becomes fraught with difficulties. But this is not to say that it should be ignored as a remedy to the problem of communication and more effective decision making.

In the final analysis informal contact will continue to be the most powerful instrument in formulating effective management goals. Every chief probably realizes this but it is a familiar area of failure either because insufficient time is available to visit sites or because they find it difficult to communicate informally on professional matters without breaching the necessary support for site librarians. I am sure informal communication will remain an imperfect art but it seems to be a fundamental necessity. Not only does it help to cement meaningful relationships, but it is of considerable psychological significance to junior staff to have this type of free access to senior management.

I have touched on a variety of managerial problems common to multisite library services not in the hope of solving them with any particular management theory but simply in the belief that being more aware of the problems often leads to acceptable pragmatic solutions. Whether or not they are lasting solutions depends on individual insight, the goodwill of colleagues and a certain amount of good fortune.

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Library-information service evaluation: a case-history from pharmaceutical R and D

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This paper describes a 19-week project which sought to examine and evaluate the library-information service at Syntex Research Centre, Riccarton, Edinburgh, a pharmaceutical R and D centre. The project was unusual in attempting to evaluate the full range of the Library's stock, activities, and services, rather than dealing with only a single aspect. The remits of the Library and of the evaluation project are noted. The evaluation design is described in detail, and summary results are provided. Activities so treated include: library stock-use records, inter-library loan requests, use of library staff time, current awareness bulletin. 36 library users, research scientists, were interviewed, and their demand for library-information services is described, using as a framework the categorisation of library service devised by Orr. Finally, there is some discussion of the validity of individual library-information service evaluation tests, and of the problems and attractions of evaluating a complete library-information service 'in the round'.

Introduction

FOR MANY YEARS, librarians and information scientists have attempted to measure libraries' ability to respond to user needs, and to quantify the benefit accruing to parent organizations from libraries. Orr's work [1,2,3,4] is of seminal importance. The field has been comprehensively reviewed by King and Bryant[5], Lancaster[6], and most recently by Blagden[7]. Unfortunately, Blagden's book had not been published when the work described in this paper was carried out.

In spite of much activity, there is no generally accepted means of quantifying and expressing benefit. Most published studies describe specially planned investigations into single aspects of a library's services e.g. adequacy of journal collections, SDI bulletins, use of library staff time. Few have attempted an evaluation of a library-information service 'in the round', covering all aspects of stock, services, use of staff, and user reaction.

This paper describes a project which sought to evaluate the full range of the services and activities of an industrial pharmaceutical research library; impact on users, quality of collections, internal efficiency, and benefit accruing to the parent organization. In undertaking this wide-ranging exercise in evaluation, it was hoped too that the intrinsic validity of individual library evaluation tests could be gauged, by assessing whether the results from Test A on, say, reactions of users to SDI service, were confirmed and supported by results from Test B on, say, user ranking of library services. Hitherto, tests have been developed and applied in isolation. Although some have been repeated,

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they have not been subjected to comparative checking against other tests run on related aspects of library-information service in the same organization.

In this paper, the term *library* is used as an umbrella term for the concept *library-information service.* Similarly, *librarian* is used to represent *librarian-information scientist.*

Information Service Evaluation Project (ISEP): Background

In 1979, the author spent a 19 week sabbatical, granted by Napier College, at Syntex Research Centre, Riccarton, Edinburgh. The purpose was to measure the adequacy of the Syntex Library's collections, to study its management and its internal efficiency, and to evaluate the effectiveness of the information services offered to Syntex's scientific and managerial staff. The extent to which user requirements, expectations, and preferences were satisfied was to be gauged. Unsatisfied information needs, and conversely, underused areas of information service, were to be identified.

Established in 1975, Syntex Research Centre (the research division of Syntex Pharmaceuticals Ltd.) has been fully operational since mid 1977, and is concerned with the full range of the drug development process: pharmacology, pharmaceutical development, toxicology, clinical studies, regulatory affairs etc. At the time of the Information Service Evaluation Project (ISEP), the Centre had a staff of 80, of whom about 60 were scientists. The centre was divided into six departments. Pharmacology, Pharmaceutical Development (including analytical chemistry, drug metabolism, and dosage design sections), Toxicology, and Clinical Research were the purely scientific departments; Business Affairs was responsible for finance, personnel, health and safety, and buildings and equipment; the department of the Managing Director, in addition to overall control and policy-making, was responsible for scientific support services; Library, biostatistics, regulatory affairs, and certain aspects of quality assurance.

Departments are led by Directors who have both scientific and managerial responsibilities; major sections are led by Senior Scientists (or Senior Managers), also with scientific (or other subject-specialist) and managerial responsibilities. These personnel comprise the Centre's senior staff. Other staff are divided into Scientist or Manager (mainly graduate, professional staff) and Technical or Administrative grades.

In 1979, the Syntex Library had a staff of three. The Librarian (a Senior Manager) was a subject specialist (pharmacist), a Chartered Librarian, and a Member of the Institute of Information Scientists; of the two library assistants, one had a training in information science. The Library subscribed to 85 journals, and maintained a bookstock of some 850 items which was growing at a rate of 300 titles per annum. In addition to a full range of library services, reference and literature search services, lending and inter-lending, photocopying etc, an in-house data-base was maintained on optical coincidence cards, and a weekly current awareness bulletin, *Libline*, was published.

The functions of the Library-information service, as agreed formally by Librarian and management, were as follows:

'1. Identification and evaluation of books, journals, standards, reports, patents, British and other national government regulations etc. relevant to the work of the Research Centre at any time.

2. Making the relevant items available within the Centre either by purchasing or borrowing, applying the standard recording, classification and lending procedures, and when necessary, arranging for translations.

3. Organizing the library collection by classification and indexing systems so that particular items can be easily retrieved either by Information Unit or scientific staff as required.

4. Exploiting the subject content of the collection by:
4.1 Producing a regular current awareness bulletin,
4.2 Providing a selective information service tailored to the information requirements of particular member(s) of staff—on the basis of regularly updated profiles.

5. Providing a technical and general enquiry answering service.

6. Supply of documents, references to which are retrieved either by items 4 or 5, or from outside sources.

7. Regular review of the collection, control of its physical size by weeding and binding and awareness of occasional need to fill subject gaps retrospectively.'

The remit for ISEP, agreed between Syntex and Napier College, who seconded the author to Syntex for the full period of the project, were as follows:

'1. Problems:
1.1 To liaise closely with management, information and scientific staff to study the structure and impact of the existing information service, with regard to deployment of human and material resources and the contribution of the service to the work of the Research Centre.
1.2 To make this investigation with reference to current good practice in libraries and information units, and to report.
1.3 The major topics for examination are as follows:
1.3.1 To what extent the collection and services accurately reflect the needs of the Research Centre in subject coverage, intellectual levels, time span, and in maintaining the quality of service to increasing numbers of staff.
1.3.2 Is the most effective use possible being made of information unit staff, the collection and ancillary facilities? Try to determine criteria for information unit decision making.
1.3.3 What are the user expectations of the information service and what priorities do they attach to the various aspects of it?

2. Proposed Methodology:
2.1 To investigate some techniques of information unit performance measurement in industrial/special libraries and to identify possible research methods.
2.2 Collect information on the functioning of the present information systems and services, and user reaction to these.
2.3 Categorize information unit staff work, eg. administration, planning, reader service, etc. and by comparison with information gathered from 2.2, discuss whether this is the most effective allocation of resources.

2.4 Identify the impact of the information service on the work of the Research Centre, attempting to trace the use of the information provided.
2.5 Report.'

A brief, journalist account of the project has already been published[8]. This paper concentrates on the evaluation activity itself, the tests used, the results obtained, and the conclusions reached.

Tests, studies, and results

The literature of library-information service evaluation was studied. Most published studies reported the investigation of a single area of library activity; examples are the work of Blick and Magrill[9], Magson[10], and Thomas and Ward[11]. Others were dependent on the collection of large volumes of data, thus limiting their application to large libraries and/or to long term studies.

In addition to fulfilling its remit at one point in 1979, ISEP was to develop an 'evaluation package' of tests and measurements which would permit the study to be repeated in whole or in part at later date(s). The study was to be designed, implemented, assessed, and reported on in 19 weeks, so this decision virtually precluded the design of radically new studies. Instead, ISEP was a wide-ranging, 'best fit', investigation involving quantitative and qualitative, objective and subjective, exercises. Whenever possible, tests which had already been tried in other areas were used, known and accepted measures were adopted. Key areas of activity and expenditure were identified and tests selected to measure these. The views of users were sought on a (common) wide range of topics.

Within these principles and constraints the components of ISEP were formulated. It was soon noted that Orr's classification of library services[3] was intrinsically useful and also had the advantage of providing a simple framework within which to describe and discuss the Library with users. This classification assumed major importance in ISEP and it is appropriate to repeat it in outline for the reader's reference. Thus:

(i) Document Services: providing specific documents on demand.
(ii) Citation Services: providing references, literature searches.
(iii) Answer Services: providing specific answers or data.
(iv) Work-Space Services: providing reader accommodation.
(v) Instruction and Consultation Services: assisting and advising readers on personal updating etc.
(vi) Adjunct Services: archiving, editing, translating etc.

This section now describes the principal ISEP investigations and provides summary results as appropriate. The full results and conclusions of the project were included in a detailed report presented to Syntex at the end of the project[12].

Demand for library services

Users were asked to rank their use of the Library's services and to arrange them in order of importance to them, using Orr's classification. Preferences so expressed were compared with Library staff's view of the relative importance of different services, and with actual demand as revealed by the Library's own statistics.

Responses showed quite emphatically that Document Services were felt to be the most important function of a library, followed, second equal, by Citation and Answer Services. Consultation and Work Space Services were placed far behind these three. Detailed results are provided in Table 1. It is interesting to compare these with the opinions expressed in a budget-gaming exercise noted later. The librarian confirmed Document, Citation, Answer Service to be her order of priority. Analysis of Library staff work diaries revealed the sequence (in terms of time allocation) Citation Service, Document Service, Answer Service. (Preparation of *Libline*, the weekly current awareness bulletin, was classified as a Citation Service). These results were confirmed by responses to other (less direct!) questions, and by the Library's own statistics.

Other specific responses about the Library's role are worth quoting: '*To obtain and circulate information . . . (relevant to Syntex) . . . and make sure (Syntex staff) keep abreast of relevant scientific developments*' (a Director). '*To work closely with scientists and provide them with relevant current information*' (a Senior Scientist). '*Identify and supply relevant documents*' (a Scientist). '*Locate relevant information, from documents, organizations, and people*' (a Director). '*To answer questions and provide journals*' (a Technician). '*To provide scientific information from the literature to aid decision making*' (a Senior Scientist).

Those working outwith the main scientific departments felt that the Library should keep them up-to-date with developments in the pharmaceutical industry in general, and with changing activities, interests, and objectives within the Syntex corporation.

TABLE 1. *User priorities in library-information services*

1.1 *34 interviewees were invited to rank the Orr categories of library service in order of importance to them as scientists.*

	1st choice	*2nd*	*3rd*	*4th*	*5th*	*6th*
Document services	17	12	4	1	—	—
Citation services	7	12	13	3	—	—
Answer services	10	8	14	1	—	—
Work-space services	—	1	1	6	10	16
Consultation services	—	—	2	21	9	2
Adjunct services	—	1	—	2	15	16

1.2 *These responses were scored, awarding 10 points for each 1st choice, 8 for each 2nd, and so on down to 0 points for each 6th choice. This scoring shows that users ranked the 6 services in the following order of importance.*

1. Document services	294 points
2. Citation services	256 points
3. Answer services	252 points
4. Consultation services	114 points
5. Work-space services	58 points
6. Adjunct services	46 points

Use of library stock

The use made of Library stock was measured and analyzed by department and grade of staff. This revealed a heavy bias towards senior staff (ie Directors and Senior Scientists), who accounted for 76 per cent of loans, and towards the departments of Clinical Research and Pharmacology; much less use was made by Toxicology and Pharmaceutical Development. The Managing Director was the heaviest single user. Requests for documents were rising at the rate of 123 per cent per annum, from 979 in Fiscal Year (FY) 78, to 2184 in FY 79. Literature search demand rose at 53 per cent per annum, from 103 in FY 78, to 158 in FY 79. Only a small proportion of this increase could be explained by real increases in Research Centre staffing levels. The journals used most heavily are listed in Table 2.

TABLE 2. *Syntex-owned journals in most demand (Top 25% of 85)*

Journal of Chromatography	82 requests in FY 79
European Journal of Pharmacology	58
Journal of Pharmaceutical Sciences	49
Analytical Chemistry	46
Nature	46
Journal of Pharmacy & Pharmacology	44
Scrip	41
British Journal of Clinical Pharmacology	37
Circulation	33
British Medical Journal	27
British Journal of Pharmacology	26
Journal of Pharmacology & Experimental Therapeutics	25
Biomedical Mass Spectrometry	22
Lancet	22
Circulation Research	21
European Journal of Clinical Pharmacology	21
Pharmaceutica Acta Helvetiae	20
New Scientist	18
New England Journal of Medicine	17
British Heart Journal	16
Cardiovascular Research	16

Adequacy of library stock

Adequacy of stock was defined as the proportion of all document requests that the Library could satisfy from its own stock. Accordingly, loans from stock and interlibrary loans were studied. High- and low-use journals were identified, and ranked accordingly. Journals borrowed most frequently from BLLD were similarly ranked. Thorpe has described similar work at Hoechst[13]. Comparison of lists of titles is interesting. Bearing in mind the extreme youth of the Syntex Library (3½ years old at the time of the project), special provision was made to identify those journals of which back-runs could profitably be purchased.

Between FY 78 and FY 79, the percentage of document demands satisfied from stock rose from 27 per cent, 258 of 979, in FY 78, to 54 per cent, 1182 of 2184, in FY 79. 1007 interlibrary loans were requested in FY 78 and FY 79, covering 472 journals. 20 per cent of these requests (226) fell on 15 journals; Table 3 provides details.

TABLE 3. *Journals most frequently requested on inter-library loan, FY 78 and FY 79*

Life Sciences	30 Requests
American Journal of Physiology	22
Naunyn Schmeideberg's Archives of Pharmacology	17
Biochemical Pharmacology	14
Clinical Chemistry	13
American Journal of Cardiology	11
Analytical Chemistry	11
Atherosclerosis	11
Drug Development & Industrial Pharmacy	10
Japanese Journal of Pharmacology	10
Journal of Applied Physiology	10
Journal of Medical Chemistry	10
Psychopharmacologia	10
Biochimica et Biophysica Acta	9
Science	9

TABLE 4. *Journals carrying most 'predate' papers*

British Medical Journal	35 Papers
Circulation	31
Biomedical Mass Spectrometry	23
Journal of Physiology	18
Lancet	17
Circulation Research	16
Journal of Pharmacology and Experimental Therapeutics	14
New England Journal of Medicine	12
Analytical Chemistry	11
British Journal of Pharmacology	9
Nature	8
British Journal of Psychiatry	8
Cardiovascular Research	7

Because of the youth of the Library's collections, many inter-loan requests were for papers in journals held by the Library, but in issues predating the Syntex files. 385 interloans were in the 'predate' category. The journals carrying most predates are listed in Table 4. These may provide workers in more 'mature' libraries with further information as to which journals tend to carry the 'longer lived' papers.

User interviews

User interviews ('guided conversations' is a more appropriate term) were held to obtain the opinion of users on a wide range of topics related to the Syntex Library in particular, and to the user's use of the literature in general. Questionnaires were not used, as the author had little experience in their preparation. A face to face interview offered opportunity to rephrase questions as required, to pursue issues more deeply as seemed from time to time appropriate, and to avoid the non-return problem. 36 people were interviewed, most individually, a few in groups of 2 or 3. Principal areas covered were the Orr library service classification, which was used as a key to detailed discussion of the Library and its services, actual use of the Library, attitudes to the literature and reading, and the individual's ability to undertake some literature searching for himself. Interviews lasted about 1½ hours. Space precludes publication of the interview outline here; copies may be had on application to the author.

With hardly an exception, users welcomed the opportunity of discussing these issues; consensus opinions were identified in several areas. Brief reports on areas of particular interest follow.

Users, particularly those below senior level, were often diffident about requesting documents. All had very inaccurate notions of average document costs, and tended not to ask for material if they felt it to be 'expensive'. The classic syndrome of £10 being 'a lot to pay for a book'! Yet most agreed that books and journals were cheap in comparison with other scientific material.

Primitive budget-gaming was introduced to probe users' feeling for the Library and their priorities regarding library-information services. Given that significantly more money were to be available for the Library, 33 per cent would have increased stock, 42 per cent would have added to Library staff (with emphasis on scientifically qualified professional library-information staff), and 12 per cent opted for more detailed information and SDI services. It was agreed that the second and third groups were making the same choice, effectively a demand, in Orr's terminology, for more Citation and Answer services. Faced with a substantial reduction in the Library's budget, 30 per cent of users would have reduced stock, expecting to rely more heavily on secondary services and inter-library loan, 20 per cent would have reduced staff. 36 per cent wished to reduce the Library's services to users, but stipulated that *Libline*, the weekly current awareness bulletin, should be preserved! A case perhaps, of throwing away your cake, and then trying to eat it! Users had to be pressed to respond to the question of cuts, the principal reaction being that the Library budget must be preserved.

Faced with a crude choice between a large, self-help library with no information services, and a small, reader-service based library, a large majority of users favoured the latter. Of the few favouring the former, all bar one were chemical, rather than life scientists, and all, without exception, agreed that the smaller, service oriented library would be more cost-effective in a research environment. Furthermore, when questioned about their personal literature searching capabilities, no scientist demonstrated any ability beyond an elementary awareness of major tools eg *Index Medicus* and *Chemical Abstracts*.

Users were asked about their scientific reading habits, and appeared to read for 3 principal reasons: to prepare for foreseen future work, to solve specific current problems, and to keep up to date generally. Most indicated that the second category accounted for most of their reading, and argued that this was wrong, that if reading (and other work?) were more carefully planned, then the first and third categories would almost obviate the need for the second.

All agreed that it was part of their job to read and keep up-to-date but despite the stated policy of management to the contrary, most scientists felt 'guilty' about reading at work. Many said that as a result, they used the Library less than they felt they should. Despite this, most interviewees stated that they used the Library or its services 2–3 times per week, in addition to daily use of small bench collections of standard reference works. Research and managerial staff spent 8–10 per cent of the working week reading. Interpersonal communication was identified as an important source of information, as were seminars and conferences. Desire to publish was surprisingly low and believed by many to be discouraged by the company. (Again, despite management policy to the contrary).

Interviewees completed a work diary for 2 non-consecutive weeks and logged all their information related activities: reading, discussing, writing reports, formal and informal meetings. Directors devoted 24 hours (out of 35) per week to information processing; other scientists, 16 hours.

User education was an important spin-off from interviews. Initially, users showed little understanding of the range of special library services, and none of their complexity. During interviews, the objectives and activities of library-information service could be explained. This significantly raised users' understanding and appreciation of the service, and increased their use of it.

Libline

Libline, a weekly current awareness bulletin, is the Library's most time-consuming single activity. ISEP tried to identify the use made of it, how successful it was in alerting scientists to appropriate literature, and the amount of time its perusal saved. This last is particularly important; the only issue upon which the library evaluation literature is broadly agreed is that the value of user time saved is the sole unassailable and unarguable cash benefit that can be assigned to a library's credit.

75 per cent of interviewees said that 50 per cent of their reading was stimulated by *Libline*, the remaining 50 per cent consisting of items recommended by colleagues, articles cited in other papers, and items discovered through serendipity.

More controlled information was sought via Blick and Magrill's test[9]. Users were invited to classify *Libline* notifications (exemplified by an analysis of 2 non-consecutive issues) as ***vital***, ***important***, ***useful***, or ***irrelevant***. Of the 27.8 per cent classified as ***vital*** or ***important***, only 8 per cent were already known to *Libline* users; of the 85.7 per cent classified as ***vital***, ***important***, or ***useful***, only 13.9 per cent would have been found by the users within one month, and 43.4 per cent would never have been found (judging from the users' expressed journal scanning habits and their own avowal), without *Libline*.

In addition to providing rapid notification of appropriate literature, a current awareness bulletin must save users' time. 21 (87.5 per cent) respondents provided information on the amount of time that *Libline* saved them. They indicated which journals they would scan personally to keep up-to-date if *Libline* did not exist. It was shown that the time needed to scan a journal is about 10 minutes. The total potential scanning time was calculated for the respondents, who were then asked how long it took them to scan the issues of *Libline* on which the assessment had been based. The difference between the calculated journal scanning time and the *Libline* reading time gave a fair approximation to *Libline*'s value to Syntex in staff-time saved. On this basis, *Libline* saved 21 users a total of 40.8 hours per month. Extending this figure to all 40 *Libline* users, time saved totalled 77.7 hours per month, or 932.4 hours per annum. Time saved per person per annum was 23.3 hours. The average cost per staff hour for professional staff at Syntex, including overheads, was given by the Department of Business Affairs as £5.40 (1979 costs). Thus the gross sum saved by *Libline* was £5035 per annum, or £125.82 per person.

Libline production is a complex exercise, demanding scientific, information science, and editorial skills, and a considerable input of staff time; 5 hours from the Librarian (at £5.40 per hour), and 16 hours from a Library Assistant (at £2.00 per hour, the average cost per staff hour for technical and administrative staff); a total of £59 per edition. To this should be added £10 photocopying costs; a total production cost of £69 per edition. 50 editions of *Libline* are produced each year; annual production costs in 1979 were therefore £3,450. Subtraction of production costs from staff costs saved gave the cost-benefit of *Libline*, on the basis of time-saving alone, as £1,585 per annum. This indicated a return on investment of 46 per cent, significantly more than the return normally expected by many companies on their investments.

The economics of *Libline* in 1979 were interesting. The marginal cost of one extra copy of *Libline* was its photocopy cost only, about £0.25, as the expensive information selection and editorial work had already been undertaken. The marginal benefit of one extra copy however, would be the same as it was for each of the present readers, 23.3 hours per year, or £125.82 per person per annum. In the period 1979–1981, Syntex's scientific establishment was to increase by about one-third. As this happened, *Libline* costs and benefits would vary as follows:

	1979—40 readers	*Future—55 readers*
Production cost	£3450	£3453.75
Value of time saved	£5035	£6922.30
Cost benefit	£1585	£2468.55
Percentage return on investment	46%	71%

These calculations are based purely on time saved and are costed at constant pound values. There is no technique for assigning a quantified cost benefit to the effect that *Libline* and other Library services have on the scientific knowledge and competence of its users. The maintenance and improvement of Syntex staff's scientific awareness is the main function of *Libline*, and indeed of the whole Library service. 27.8% of the *Libline* output is regarded as *vital* or *important*. Only a small proportion of this material would be traced in *Libline*'s absence. In this lies the greatest part of its cost-benefit.

These results are presented in some detail because cost of time saved is one of the few unarguably assignable and calculable benefits of libraries.

Library staff statistics

Statistics were collected over 4 non-consecutive weeks to study the work flows of Library staff, to establish staffing costs and relate these to specific tasks, and to identify areas showing dissonance between stock resources or staff time resource allocation and user demand. Much of the base work for this area of the study was done by Thomas and Ward[11 14], and by Revill[15]. Library staff's allocation of work time is presented in Tables 5 and 6. To minimise disruption of normal work, no attempt was made to locate 'lost' time. The amount of lost time lies within the allowances made for 'down-time' by many work-study consultants.

TABLE 5. *Library staff allocation of time*

		Librarian		*2 Library Assistant's (each)*
Paper work and telephone		3.9 hours/week		9.83 hours/week
Reading		0.78		0.25
Formal meetings		3.67		0.22
Informal meetings		6.83		0.55
Reader services:				
Document	1.85		3.60	
Citation	2.12		0.13	
Libline	5.02		8.03	
Answer	0.95	9.94	0.77	12.53
Document selection and handling:				
Selection	2.50		3.05	
In-house database	0.73	3.23	1.55	4.60

Much of the above may be assigned to Orr's library service categories. Thus:

TABLE 6. *Staff time converted to Orr's library service categories*

	(a) Librarian	*(b) Library Assistants(2) (each)*	*(c) Totals (a+2b)*
Document Service	*4.35 (hours/week)*	*3.60*	*11.55*
Citation Service	*7.87*	*8.17*	*24.21*
Answer Service	*0.95*	*0.77*	*2.49*
Consultation Service	*5.50*	*0.10*	*5.70*

Technical Services Cost Ratio (T-SCORE)

T-SCORE[16] relates the purchase price of publications to the cost of acquiring and processing them by a library (indexing, cataloguing, subsequent usage etc). Lancaster[6] notes that in many libraries, a T-SCORE around 1:1 is discovered. For this reason, a

T-SCORE around (or, better, below) 1:1 is generally regarded as acceptable. Such a T-SCORE would be praiseworthy in an information service oriented, therefore labour intensive, special library.

Library work diaries and analysis of expenditure records permitted calculation of a T-SCORE for the Syntex Library. The total amount devoted to purchasing documents, including inter-library loans, was £8,784 in FY 79. Subsequent handling costs include all Librarian and Library Assistant time spent in this activity, indexing, and storage and overhead costs, and may be calculated for the same period:

Document handling (processing cataloguing, lending etc)		
484.8 Librarian hours	@ £5.40	£2617.92
1557.6 Library Assistant hours	@ £2.00	£3115.20
Indexing (done out-of-house)		£ 800.00
Overheads (33 per cent of total Library overheads estimated by Financial Manager to be £2000)		£ 666.00
	TOTAL	£7199.12

T-SCORE for the Syntex Library is therefore £8784 : £7199.12 or 1:0.82, a figure seeming to indicate high internal efficiency in a library operating a wide range of information services.

Derived Value assessment

Most investigators assert that users must have a 'positive feel' for their library and its services if they are to make best use of it. Wills and Oldman[17] developed their Derived Value Ratio (DV) to provide a measure of the degree of satisfaction users felt they derived from their library. The closer DV approaches one, the better. Thus:

$$\text{DV} = 1 - \frac{\text{Expectation} - \text{Perceived actualisation}}{\text{Expectation}}$$

Wills and Oldman[17] state (p. 66):

'In identifying perceptions of what is happening we are taking the value question further than it is usually taken and an example of the perceived actualisation phenomenon may be helpful. A library may provide a plethora of services—literature searches on demand, computerised information retrieval system, multiple copies of standard texts with a 90 per cent satisfaction level, a coin-operated photocopy service from 20,000 serials and so forth. Nonetheless the system can fail perceptually. There is a queue at the issue desk, there are no tables to sit at, the photocopier breaks down or the computer budget is overspent'. This parallels Orr's statement[4] that *'primitive notions of quality and value . . . . . . serve as ultimate criteria'*.

Interviewees estimated first what percentage of their total information needs could be supplied by an ideal library, and then the proportion of those actually supplied by the Library at Syntex. These gave figures for *Expectation* and *Perceived Actualization* respectively. Estimates made by individuals in this way must necessarily be individually crude, but averaging the estimates of many users produces a fairly reliable figure.

DV was calculated individually for each interviewee and results ranged from a high of 1 (total satisfaction), signified by 5 interviewees, to a low of 0.25. Average value for

30 interviewees (half the Research Centre's scientific establishment) was 0.77. This may tentatively be interpreted as a vote of confidence and expression of satisfaction with a small, recently established Library, particularly when set against the more structured opinions and measurements from the other ISEP tests.

The Derived Value calculation enabled the author to obtain some measure of users' 'considered perception' of the Library, its stock, and services. Individual tests naturally provided detailed, slightly variant, but correlating perceptions; DV assessment provided an omnibus view 'in the round', and thus neatly paralleled the fundamental aim of ISEP itself.

This wide ranging series of tests appeared to satisfy the ISEP criteria: they covered the whole range of Syntex Library activity, permitted full analysis of the Library, and provided cross checks between areas; they had been used elsewhere and were known to 'work'; the Syntex data could be compared with results already published; they were not dependent on large volumes of data; they could be carried out and reported on by a small team in a short space of time; they provided users with opportunity to express opinion and make wishes known to investigators.

ISEP conclusions

The conclusions and recommendations of ISEP, in its 1979 Syntex implementation, are not particularly relevant to this paper and only the most significant are presented here. A full statement is recorded in the main ISEP report.[12]

The Syntex Library was valued and heavily used, particularly by senior staff. At and above professional scientist level, users expressed very strong preferences for service oriented as distinct from self-help (or personal browsing) libraries. It was accepted that this preference should be paid for in higher levels of library staffing, it being established that the cost benefit of e.g. *Libline* more than compensated for such expenditure.

The Library was agreed to be understocked, and was satisfying a relatively low percentage (54 per cent) of document demands ex-stock. This was only partly attributable to the youth of the Library and of the Research Centre. The most important single reason was inadequate initial funding.

The Library's initial budget had been to some extent 'conjured out of the air' in 1975 (*not* by the Librarian!), based largely on the cost of the journals requested by those staff first in post when the Research Centre was established. Subsequently, lacking quantified evidence and aggressive budgeting by the Librarian, that sum was merely increased by inflation and natural growth elements. ISEP's information was welcomed by the Librarian as it has allowed funding (and stock levels) to be set on a firmer, reasoned footing.

Similar comments apply to staffing. There was demand for closer formal and informal contact between Library staff and users at all levels, and a consequent need, now implemented, for additional professional staff. This has permitted direct Library involvement on project teams and further refinement of SDI services.

The in-house optical coincidence retrieval system was expensive in staff time, and was underused. Given extending public online search services, it has since been abandoned in favour of other services.

A final point may be familiar. The Library, charged with the responsibility of supplying information to keep people up-to-date, was itself in need of information: a current awareness service from management about future development plans, and feedback from users about their need for and reaction to Library services.

Cost of ISEP

A rough outline of costs was prepared at the end of the project. Some points should be noted: figures are for 1979 salary levels; some of the research data required had been collected as part of the Library's everyday management; stationery and documentation costs are omitted; much of the salary cost would be once only, generated by the need to research and prepare ISEP for the first time.

Actual costs (1979 prices)

(i)	ISEP researcher—19 weeks		£3200
(ii)	Library assistant/secretarial time (1½ days/week: 19 weeks)		440
(iii)	Access to literature and literature searching online		40
(iv)	Interviewees' time (35 participants: 2 hours each)		380
		TOTAL	£4060

Estimated cost of re-running ISEP (1979 prices)

(i)	Researcher—6 weeks		£1010
(ii)	Secretarial		230
(iii)	Literature		20
(iv)	Interviewees' time		380
		TOTAL	£1640

Discussion

ISEP's interest and significance may be said to be fivefold.

Firstly, an industrial research library was studied in depth by an outside observer across the range of its activities and services. For the first time, a genuinely defensible funding and staffing level can be prepared for the Library, based on proven use, demand, and known preferences.

Secondly, a picture was drawn of the information needs, work and study practices, and the library and literature use habits and attitudes of a group of research scientists and scientific managers. Library staff now have a clear statement of user needs, in service rather than in subject terms. In preparing this picture, a great deal of user education was accomplished. Communication, formal and informal, has been greatly improved. As a result of all of the above a reasoned, properly founded, 5–10 year plan for the Library's development has been produced.

Thirdly, Syntex now has an 'evaluation package': tests, flow charts, data collection sheets, interview outlines etc, which can be implemented with a minimum of preparatory work in the future, at regular or irregular intervals, when it is felt appropriate to examine again all or part of the Library's activity. Library staff have become accustomed to subjecting their tasks and expenditure to critical assessment and to the need for regular, formal and informal, appraisal of objectives and duties.

Fourthly, Library assistants became more involved in the '*Why?*' rather than the '*How?*' of the Library's activity, and developed thereby a better understanding of the policies, objectives, and strategies of library-information work. Library users gained by contact with the project, particularly through the interviews, a better understanding of, and therefore sympathy for, not only Library policies and services, but also the Library's own problems and needs for information and for resources. The Librarian reports that this increased user understanding of the Library has been maintained since 1979 and has been largely instrumental in helping her to implement service, stock, and staff developments, and to obtain resources. It has also increased the demand for Library services.

Fifthly, ISEP has provided some insight into the value of some library-information service evaluation tests by applying together, as an integrated package, tests originally designed and carried out in isolation. The results obtained at Syntex in the various tests correlate well, and this is some indication of the tests' individual validity. The author, collecting information and gathering statements and opinions throughout the project, constantly met examples of certain data confirming either other data or subjective opinions, thus confirming the veracity of items previously brought to light. Very positive DV and T-SCORE results (which shed light on exernal impact and internal efficiency respectively) are paralleled by excellent correlations between users' expressed needs and preferences, Library staff time allocation, stock-use statistics, and the success of *Libline.*

No definitive methodology of library evaluation 'in the round' has been established. No effort was made to assign quantified or financial benefit to subsequent use of information provided by the Library to users. It remains beyond the present state of the art to produce overall cost–benefit figures that may be safely and unarguably used in proposals to management and accountants. It is still concluded that only the user's estimate of time saved, and the (salary related) cost of that time to the parent organization can be unarguably claimed for a library's credit balance.

An important goal to pursue in library-information service evaluation is multiplicity of testing and of measurement. Evaluators should study as many of a library's services, and as many areas of its stock, and should study these from as many angles, as possible. This is subject of course to constraints of staff, time, and the proper need to produce evidence and/or results in a reasonable period of time. Given the present state of the art of library evaluation, no single test is entirely convincing in itself, and evaluation results are useful and reliable only if supported by like evidence from other tests from other areas of the library's activity. Two tests are almost invariably better than one; three are better than two; four . . . . The more areas of one's library one sets out to evaluate, the better and more reliable that evaluation will be.

The ISEP package could, with appropriate adjustment to local needs, be implemented in other establishments, and in large or small libraries. It would be valuable to introduce more users to the Orr library service categorisation both as an exercise in user education ('what the library can do for you'), and to provide a clear picture of user desires and preferences.

What ISEP has produced and tested then, is a working (and work-a-day) package. It can examine most areas of a library's activity and can be applied with a minimum of preparation by existing staff in large and small libraries. It will produce a package of information which will help library management prepare conscientious and reasoned plans for development.

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Gateway—an enhancement of Prestel

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Gateway and Prestel

THE INTRODUCTION OF the Gateway facility in March 1982 as an enhancement of the Prestel viewdata service has considerable effect on its basic character. The facility enables Prestel users to be linked via Prestel and the Packet Switched Service, to external computers, allowing a range of new services to be offered. This paper examines the signals which are coming from the viewdata industry and potential user organizations in order to analyze the directions in which this more sophisticated form of Prestel may be channelled.

This paper will give an outline account of:—

—the background to Gateway's U.K. introduction
—how the Gateway facility operates
—applications and the industries likely to be affected
—Gateway's longer term influence

The background

To put Gateway into its context in the development of Prestel, one should look both at the UK and German experience of viewdata. The German Bundespost began to consider how to implement viewdata following a successful showing of Prestel at the Berlin Fair in 1977. It was decided to operate test areas in the Berlin and Nordhein-Westphalia states using the addition of computer to computer networking to Prestel's basic software. The Bildschirmtext service was opened, following the passing of enabling legislation, in June 1980. In October, the computer networking facility was added, providing links to 5 external, private computers. By December 1981, seventeen 'Gateways' had come into operation—four banks, four mail order houses, four electronics manufacturers, two computer service centres, two travel agencies and one agricultural organization. More than 40 companies have now applied for their computers to be connected. One measure of its appeal perhaps lies in the experience of the small Verbraucherbank of Hamburg. It now offers viewdata banking to 2,000 accounts and has amassed a prestige that has attracted on three other banks including one of the largest, the Deutsche Bank.

The omens for Bildschirmtext's investment—£100m, by the end of 1986—seem promising, as its timing has been fortunate. The contractors, IBM, will be working to the now agreed European viewdata standard in constructing the national system, and set manufacturers should be encouraged to increase production and lower price,

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by being able to offer the 'Final' set decoder which is operable throughout Europe. The Bundespost's plans for viewdata are therefore a very positive and encouraging endorsement by the largest economy in Western Europe.

The pressures in the UK for introducing the Gateway facility should be understood within the context of how an operational viewdata service is run. User feedback on the system is constantly analyzed and the conclusions are incorporated in a finite amount of software programming effort in order to improve Prestel's commercial attractiveness. Gateway was selected early in 1981 by this process essentially because of its ability to greatly increase interactiveness with the user. It should be seen as complementary to private viewdata and data processing systems, enlarging their markets by networking to a greater proportion of the country. Gateway opens up the means of cheaper communication; the individual organizations provide their own specialized services.

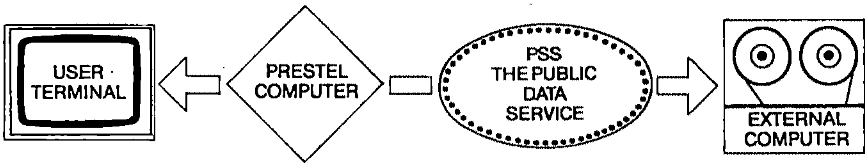
Two fundamental improvements in Prestel can be created using Gateway:

Firstly, *real-time* interactiveness with users. This means the ability to handle complete transactions for services and not require the user to telephone separately for confirmation of availability. For example, travel agents can process precise details of the customer's requirements by the computer and the accepting/declining of the booking is communicated to the user in seconds.

Secondly, extremely large databases, such as bibliographic reference works, were not particularly suitable for public Prestel, as this involved appreciable editing effort. The replication of the large database throughout the computers on the Prestel network was also not a very efficient mode of working if the 'hit' rate on individual records was relatively low. Gateway dispenses with this editing and replicating effort and communicates to a wide audience a database that is often already required for other commercial reasons.

Because of these advantages, Prestel decided to give a high operational priority to introducing Gateway, and announced it twelve months before the planned opening date of end-March 1982 to allow interested organizations to investigate and prepare. The facility will become operational in two phases. The first phase follows the conversion of the London area computers Derwent and Enterprise, to Gateway working; the second, completed by the end of 1982, reflects incorporation of the Gateway software in all Prestel computers, thus allowing 62 per cent of normal UK Prestel telephone users the opportunity to access Gateway services at local telephone call rate.

How does Gateway operate?



A Prestel call to a Gateway database starts with the user accessing on Prestel a frame designated a 'Gateway' frame by the 'external' information provider (EIP). Prestel then sets up a packet switched link through the PSS network to the external computer (EC). Flows of packets of data may follow in which Prestel's operations are largely transparent to the user, being mainly temporary storage of information from the EC and systems messages. The Gateway protocol governing these flows serves to reduce PSS transmission costs.

Prestel will handle billing and administration for Gateway databases. Frame charges set on externally accessed frames can be billed for by Prestel which makes the connection of the smaller scale user an economic operation.

The facilities available to EIPs strengthen the current information retrieval and data capture capabilities of Prestel. To speed information retrieval to the user, the Combine facility allows over-writing of a frame already transmitted to change only those fields which need amendment, rather than transmit an entire frame.

The more significant change, however, is the Data Collection facility, which enables much more detailed, intelligent data capture by the service provider. The user is asked to complete certain fields, generally in order to request a particular service or item. He is prompted by a line message related to each field. When the frame is completed, the EC can analyze the data and respond to the user. Thus Gateway has the potential to enable Prestel to offer the user completely customized services, eg an individual bank statement, or series of information records programmed by user number. Prestel speed and PSS economy are enhanced, as only the completed fields, not entire frames of data, are transmitted to the external computer.

At the end of the Gateway call, the user can either return to the Prestel resident database to use other services or disconnect entirely.

Applications

The nature of Gateway applications will be determined by its particular combination of strengths; these are:—

—its ability to act as 'parent' to an almost infinite number of Gateway databases;
—its capability for real-time interaction with the user, and for searching of encyclopaedic scale databases;
—its low 'barriers to entry' for users; relatively inexpensive terminals and online usage charges;
—its simplicity of use, a characteristic which will be maintained as more enhancements are added.

A variety of commercial and industrial sectors are taking an interest in Gateway's possibilities.

Firstly travel. Tour operators and airlines are already much in evidence on the Prestel database. Over 2,000 terminals are in use, mainly in travel agents. The development of Gateway will mean agents can survey which services are offered on Prestel itself, then access the service provider's own computer to check current availability and make a reservation which can be confirmed immediately.

Another major area will be banking, both for retail and wholesale operations. We would expect bank customers to be able to access statements, create or amend standing orders, carry out fund transfers and other facilities of remote banking. The commercial pressures for this lie with the 11 million unbanked adult population and the high cost of extending the network of bank branches. Similar developments are expected among building societies and credit card companies. Pressure for online insurance quotations is also in evidence.

The mail order industry can benefit through using Gateway to provide an online ordering, account and delivery information service. Along with banking, it is a major element of the Bildschirmtext services and could serve to increase domestic usage to Prestel.

The use of viewdata within medium to large organizations seems likely to take a number of forms. Firstly a number of executives will need external information such as business news, or exchange rates. This need is best met using Prestel without Gateway. Secondly, more complex external services e.g. detailed company information or specialist analyses, could be met externally via Gateway. Thirdly, the organization might have a private viewdata system conveying internal information such as messages, stock levels or production or sales figures. Fourthly, internal information could be networked via Gateway to provide a travelling sales/engineering force with an inexpensive message/information service. These developments seem likely to result in viewdata sets being placed in a wide range of sites, in offices and within the home.

The second application mentioned, company information and business services moves the subject matter of Prestel closer to that of the information scientist.

Although some of the other non-commercial specialist online reference systems may continue to be used without utilizing viewdata, there are some signs that the nature of international online systems and viewdata are converging.

Certain general observations are relevant. There is a trend in the handling of information requests from batch to online processing as used by viewdata; it is predicted that more than half of the European market will be online by 1988. There is also the increasing tendency for sets to be placed with the end-user rather than in a central location, which favours viewdata because of the low unit cost of terminals and their ease of use. Concomitant with this is the shift from bibliographic or reference to source databases which contain the 'hard' information.

Another development which should be noted is the growth of demand for information by the smaller user. Up to now the main marketing effort, led by US organizations, has been directed at the larger, high value users. Possibly caused by the competitiveness between host databases, a trend has appeared which would encourage this growth, namely the swing from subscription to 'pay as you go' charging structures by hosts anxious not to restrict the scope of their market.

The question that cannot yet be answered is precisely which online services will be routed via Gateway. Responsibility for these decisions naturally lies in the realm of the database vendors. What will most attract them are expansion of their market to Prestel scale and its capability for billing small users. Perhaps the most likely subjects would probably be in the legal, general business and financial areas, but it has generally proved unwise to attempt to predict the directions viewdata will take. What appears definite is that with the aid of Gateway, Prestel services will become more sophisticated and specialist, while online services are being oriented more to take account of the untrained end-user. We should be confident that any marriage of the two will bear fruit.

Gateway's longer term influence on Prestel

Gateway's first effect will be to increase the use of Prestel in the business sector, with most impact on the travel and business/financial markets. In the wake of increasingly inexpensive adaptors, the balance of use of viewdata will shift from medium to large organizations into the home where remote banking and teleshopping are likely to become popular.

Another major facet of domestic use is the increasing use of personal computers to interact with Prestel. Prestel's new network, PANDA, which will be implemented over 1982 and 1983, enables both national Gateway and message services.

This list of developments, by no means comprehensive, gives an indication of the forces that will greatly extend Prestel and private viewdata use over the next couple of years, in business locations but also increasingly in the home.

ACKNOWLEDGEMENT

Acknowledgement is made to the Director, Prestel, for use of the data within this paper.

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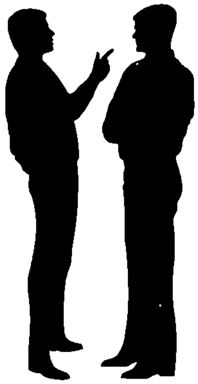

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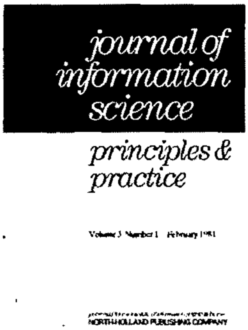

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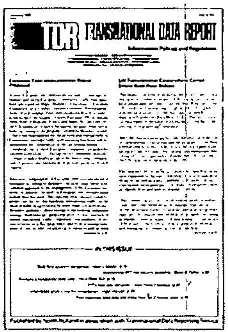

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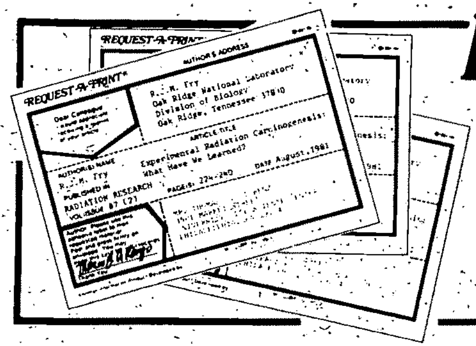

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Taking the measure of service

Blaise Cronin

Aslib Research and Consultancy Division

Paper presented at the Department of Library and Information Studies, The Queen's University, Belfast, March 1982 as part of a one-day course: Establishing Objectives and Evaluating Services.

An analogy

I SHOULD LIKE to begin with an analogy, which was used originally by Alan Gilchrist[1] in a paper on cost-effectiveness some years ago. The analogy is repeated almost verbatim because it says precisely what I want to say, better than I could have said it myself.

This short course is an information system: you are the users and I am one of the documents retrieved by the system operators. Each of you will 'read' up to 3 documents and discuss aspects of their content with one another. The cost to each one of you is the course attendance fee. Like you, the course organizers have chosen to expend energy on this rather than some other activity. Three sets of people, the course organizers, your employing organizations and yourselves, all have individual expectations of what the course will and should provide, and when the course is over you will doubtless assess to what extent these expectations have been met. Your views may well depend to a considerable degree on chance: a serendipitous chain of thought or moment of critical insight triggered by something one of the speakers (or participants) said, a casual exchange of ideas with another attendee over a cup of coffee, or a delayed realization of the significance of a point made by one of the speakers when confronted with a particular work problem some months hence. It may be that those people who actually coughed up the attendance fee will require some sort of written account of the day which they will use as their basis for assessing the worthwhileness of the event. Others among you will have to decide for yourselves whether the money was wisely spent: whether the time could more usefully have been spent elsewhere. This analogy, still quoting Gilchrist, highlights some of the problems which discussion of cost-effectiveness raises. These include:

(i) the different perspectives or standpoints from which success/satisfaction may be judged
(ii) the different ways in which success can be judged from these standpoints
(iii) the existence of delayed or long-term effects
(iv) the difficulty of relating cost to a complex purchase

Effectiveness

To talk meaningfully about effectiveness we need to have a clear understanding of the baselines against which achievement can be measured. Effectiveness cannot be

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considered in isolation from predetermined goals or pre-set performance targets. As such it is quite different from efficiency. In a sense, efficiency is an inward-looking measure, whereas effectiveness, at least as far as libraries are concerned, is an outward-looking measure. Wessel and Cohrssen got close to the distinction when they said:

> 'Operations are efficient, services are effective'[2]

Efficiency is a feature of a service which can be achieved without taking into account the organization's overall aims or intentions. A branch library may operate a whisperingly smooth and trouble free automated circulation system, and in that sense may be a model of efficiency, but if the library is poorly sited or staffed by unhelpful individuals it may well be failing if the objective of the library service is to reach as broad a population as possible in that locality. Efficiency can be measured without reference to effectiveness, though that does not mean that considerations of efficiency should not be taken into account when assessing performance effectiveness. Whenever possible efficiency should be striven for within the framework of an organization's or institution's programme of objectives.

Management by Objectives

Logically, the starting point for any consideration of effectiveness evaluation should be the whole question of organizational objectives. To put it another way, we need to begin by thinking in terms of Management by Objectives, or MBO, as it is commonly known. MBO is more than a fashionable acronym; arguably, it is synonymous with responsible management in the public service sector. Personally, I think Rizzo summed it up nicely when he said:

> 'A prime thrust of MBO is its concern for the specification of and commitment to outcomes, and as such it forces consideration of organizational effectiveness. Managers who focus on outcomes are focussing on effectiveness. Objectives may also be formulated that aim at improvements in efficiency. Here the costs of achieving given outcomes are examined, and objectives are set to reduce costs without reducing results or to increase results without increasing costs'.[3]

In the context of this talk I shall use MBO in a generic sense, that is to say, I am concerned not with the refinement or development of MBO into, for example, PPBS (the Planning-Programming-Budgeting-System) or any other management style, but with a management *attitude* which takes as its basic premise the need to formally set objectives. I am also making the assumption that implicit in the setting of objectives is the desire to increase the utility and the degree of exploitation made of the service, not just quantitatively but also qualitatively. To put it another way, I am thinking in terms of a service which is active in promoting itself, and active in discovering and trying to fulfull unexpressed as well as expressed needs. Later, I would like to come back to the whole question of need fulfillment and user-orientated service policies, and indeed the role of marketing in relation to library services. For the moment, however, let us return to the matter of setting objectives.

Inputs and outputs

Broadly speaking, there are two types of performance measurement. On the one hand there are those which relate to output: to what extent did we achieve our performance targets; to what extent did the service attain the desired level and quality of response? In this instance we are talking about output measures. What is here under investigation is the consequence of a particular policy implementation. On the other hand there are measures which are essentially input-orientated. It is possible that certain standards can be achieved, but their attainment or non-attainment does not reflect on performance, or on the quality of the service offered. In this paper we are concerned with output measures (i.e. performance viewed from the perspective of the service/system user). We are not particularly interested in input measures, though they can of course be useful in establishing baseline or normative figures for comparable organizations. There are many prescriptive standards of the latter kind. The Bourdillon standards in this country,[4] the IFLA standards,[5] or the comparative figures produced by the Centre for Interfirm Comparison in its recent study of public library allocations.[6] Other standards of this type are the (now dated) figures produced by Friedman and Jeffreys[7] on cataloguing and classification costs, or the recent set of comparative cataloguing cost figures produced by the Centre for Catalogue Research at Bath University.[8] In all these cases a standard is either arbitrarily set or implied on the basis of averages. Adherence to these standards may well lead to overall improvements in the service offered, but it does not automatically follow since they can be aimed at without any thought being given as to how they might, or why they should, relate to objectives. One current periodical for every 250 people in the service area may be a good thing, but in isolation, divorced from service objectives, it looses, or is denied much of its potential value and meaning.

Mission statements

To state the obvious: performance measurement presupposes the formulation of attainable goals. It is quite pointless to imagine that overblown and flatulent mission statements of the following kind can serve any very real purpose:

> *The goal of the library service is:*
>
> 'To aid in the creative use of leisure time'
> 'To develop an appreciation of recorded knowledge'
> 'To help people become better, more fulfilled human beings'
> 'To assist individuals in satisfying their information needs'
> 'To facilitate educational advancement'

I'm not saying that libraries do not in fact contribute to a deeper appreciation of leisure time, or indeed help in the formation of socially acceptable ideas, it's just that it's terribly difficult to demonstrate or quantify the extent and rapidity with which such infusions of enlightenment occur. No one questions the right of librarians to cherish and relate to such beliefs, but the pragmatist might question their usefulness in any objectives-setting programme. For practical purposes an organization is well advised to forego philosophical mission statements and concentrate instead on identifying key performance goals whose attainment is, to a greater or lesser extent, measurable. Peter Drucker makes precisely this point in a very readable article entitled

'*Managing the public service institution*'.[9] He argues that the objectives of service institutions, or budget-based institutions, as he likes to describe them, are 'intangible' and that '(d)ependence on a budget allocation militates against setting priorities and concentrating efforts' because a service institution, in order to obtain its budget, 'needs the approval, or at least the acquiesence, of practically everybody who remotely could be considered a "constituent"'. A public service, in other words, 'must instead try to placate everyone by doing a little bit of everything—which, in effect, means achieving nothing'. Measurability should be the library manager's watchword. So, instead of the objective: 'To encourage literacy and a love of reading' we might substitute the following short-term component objectives: 'Establish a programme of Adult Literacy classes in two branch libraries with groups of locally recruited volunteer instructors', and 'Invite a number of nursery classes to visit certain libraries on specified days for combined story-telling and play sessions'. Quite clearly it is going to prove considerably less difficult to evaluate the extent to which the latter objectives are realized and to arrive at some estimates, albeit crude, of the impact of the two policy decisions, providing that an evaluation of the two programmes is carried out. Evaluation is a natural consequence of setting objectives in that it provides the feedback which allows management to review the success of the parent programmes and to consider the wisdom of continuing or modifying the original design. Inevitably, this gives rise to a management cycle which in simplified terms can be reduced to the following stages:

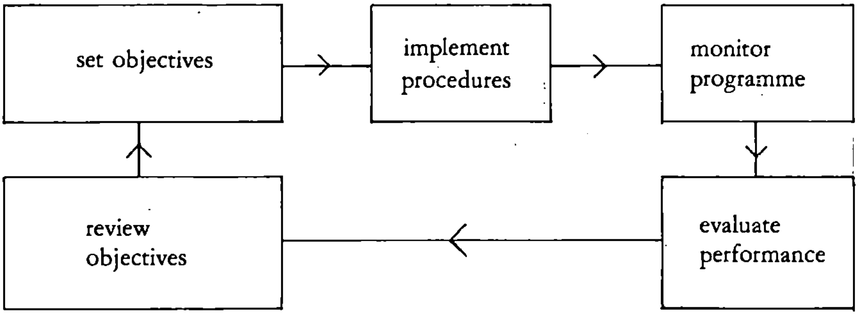

FIG. 1. *The objectives cycle*

Naturally all this does not happen in a vacuum. The extent to which objectives are set, and the extent to which their implementation can be supported (with staff and other resources) will be a function of organizational climate. Without a goal-setting management team, and without staff who are willing to support objectives-driven service policies, and without staff capable of providing and monitoring change, then, of course, little can be achieved. This may seem like stating the obvious, but it is important to stress just how important the prevailing climate within the organization is, if the desired results and necessary experimentation are to be achieved. I know there is a tendency to talk as if libraries have shared goals and functions, but it doesn't in practice follow from this that individual library systems select absolutely identical objectives.

All things to all men

From the library user's point of view one of the most appealing aspects of the public library service is its many-sidedness. Libraries, as we've so often heard, are serving a number of markets: education, information and recreation. In doing this they are serving three, often overlapping, but not necessarily identical populations. Inevitably, at a time of retrenchment, the library has conflicting priorities. To satisfy all the sub-groups in each of the three broad markets becomes increasingly difficult. Paradoxically, the strength of the library service is the cause of its current weakness. Forced to disperse its shrinking resources over an ever-expanding range of functions and specialist activities, the library is unable, in many cases, to maintain the desired and expected level of service. By trying to offer the widest possible mix, by trying to achieve the greatest possible degree of impact on the community, the library is forced to spread its resources more thinly than it would like. In practical terms this creates problems at the policy formulation level. Faced with a variety of competing claims for priority (is automated circulation more important than an additional branch library; is an additional half-day closure less acceptable than a fixed percentage reduction in the bookstock; is the maintenance of the domiciliary service of greater social value than newspaper and magazine provision; how does the library view the relative worth of maintaining online services and employing ethnic specialists? . . . the choice may not be quite so straightforward or so clinical but the nature of the dilemma is as described) the library manager has to come to a decision as to where cuts and growth can be achieved. In such a situation 'adhocracy' is hardly the ideal solution. It is the harsh reality of such decision making climates that demonstrates the practical relevance of Management by Objectives. If a service has a firm view of the direction in which it is going, if it has an agreed priority table of future tasks, then painful decisions can more easily be made. This is even more relevant for the contemporary library service, since, as I said, it attempts to be all things to all men.

It is precisely this tradition of multilateral service which library services (public, academic and special) are finding impossible to maintain, and a number of writers see the library as being caught between two irreconcilable service philosophies. One of the more eloquent predictions of gloom is that provided by Kas Kalba, who says:

> '. . . ironically the very factors that preserved the institutional credibility of libraries in the past may now be acting to undermine library survival. Libraries have traditionally served as one-stop information supermarkets. They served the needs of diverse users in diverse subject areas . . . However, as the need for information services in our society has become more pervasive, immediate, and complex, newcomers to the information marketplace have challenged the library's role . . . The problem is that no matter which alternative the library pursues at this point, its viability is not likely to be ensured. If it abandons or downgrades a new service, it is pushed back to square one with a declining user base. If it charges for the service, it places itself into competition with the private sector—with 'infobusiness', which because of greater specialization and without a geographically-circumscribed market, will win in the price or convenience war that will inevitably take place'[10]

The hallowed Trinity

Maybe the library should resist the temptation to spread itself so expansively. Might it not be better advised to concentrate on a few well chosen areas where it can consolidate its position in the public's eye? I don't think Alex Wilson[11] was voicing a lone opinion when he suggested that the library should seriously consider whether it ought to continue supplying recreational materials on demand. In essence, his argument implies the need for greater streamlining in modes of service provision, and for greater selectivity in the marketing of library services. In an era of obsessive fiscal accountability might not the library service be better advised to develop and expand its informational role to individuals, local government staff, industrial and commercial organizations? Much has been written about the economics of information. Ultimately, the debate boils down to the question: 'What is the value of information?', or to put it another way, 'What is the disbenefit of documentary deprivation?' Until now, there has been an absence of convincing evidence to support the universally held belief that information is a socially essential and desirable commodity. If there were, then, presumably, the library would be in a strong position to lobby for increased funds to develop its informational capacity. However, it may be that some recent research by Harold Borko can provide hard evidence to satisfy sceptics. Basically, what Borko did was apply a standard Cobb-Douglas econometric model to the activities of industrial library-information services. On the basis of his work he concluded that:

> '... information is indeed an economic resource which behaves similarly to capital and labour, and that an investment in information increases productivity.'[12]

Despite this heartening breakthrough, if breakthrough it in fact is, I am not sure that we can say that the same necessarily applies to the varied contributions made by the library service to society.

I shall come back a little later to the problems associated with attempts to measure social benefits in relation to library usage, but for the moment I would like to say something more about the library's choice, i.e. the need to prioritize particular service functions in the face of competing claims for priority. The question, 'Is it education, is it recreation, or is it information which is our primary concern?' has traditionally been treated as a philosophical problem, one suitable for leisurely and intelligent post-prandial debate. Latterly, the question has acquired a much greater practical significance, as financial constraints have tended to concentrate the library manager's mind on the consequences of unquestioning loyalty to this hallowed Trinity. In some cases managers have covertly adopted a policy of emphasizing one or two elements of this Trinity at the expense of the third, but of course the final decision will be a reflection of local policies, traditions and the prevailing organizational climate. Even within services whose policy preferences are similar there will often be differences in the interpretation and implementation of particular policy decisions. In some cases it may be that a library service in trying to accommodate the Trinity creates internal tensions in its management practice and in its attempts to operationalize policy. I mention the possibility of misalignment between policy and practice in order to highlight the need for individual library services to independently develop and assess their management philosophies and objectives. I don't think there is much of practical value to be gained by claiming that all libraries have common aims and objectives, and accordingly can apply the same approaches to performance assessment in all contexts. Objectives and their constituent tasks have to be conceived in response to local requirements and conditions. There is no simple all-purpose box of management tricks which can be used on every occasion.

The common good

Having said that, I still intend to look at a battery of techniques, tools and methods which can be used by libraries to measure performance, although I doubt if they would be much help in trying to assess the extent to which a library service had fulfilled its broad objectives. I agree absolutely with John Allred that the whole notion of the 'common good' in relation to public library performance is impossibly difficult to define. This, as I've implied, is because libraries have a diversity of goals and objectives and an ill-defined idea of what their common purpose is, or ought to be. As Allred says:

> 'The whole idea of a "common good" assumes a consensus of values and it requires little thought to see that, as with institutional goals, the idea really conceals many, and varied, values.'[13]

I also agree with Allred when he says that 'it is not clear where libraries are going, or even more so, where they want to go', but I don't think this should inhibit experimentation with performance measurement. I think we can recognize that evaluation (in the purist's sense of the term) is different from, and more than, the technology of assessment, but I don't think it is appropriate that we hold back until the fundamental question about purpose has been answered. Often, when the word evaluation is used in the professional literature it is not being employed in the purist's sense. This is particularly true as far as studies of information services and systems go. I am inclined to feel that it is better to think in practical terms, rather than in terms of the ultimate social impact. To support my contention I would like to invoke the observations of Flowerdew and Whitehead in their review of cost-effectiveness and cost-benefit research in information science. They wound up their report with the following 'impressionistic' comments on the literature as a whole.

> 'Many of its deficiences arise, it seems to us, not because the authors oversimplify by taking too pragmatic an approach to their problems, but because they are not pragmatic enough. There is a general tendency to leave problems undefined, not to be precise about the meaning of the answers obtained and to stress the data inadequacies; as if these difficulties, in part outside the analyst's control, in some way excuse inappropriate definitions of costs or inconsistent measures of effectiveness or benefit. A stronger problem orientation, in which it is clear that the objective of the research is to help managers to reach positive decisions would, we think, produce much sharper analysis and, in the end, research which is both theoretically more sound and practically more useful.'[14]

I'd like to follow that with another quote from Flowerdew and Whitehead which should help clarify why I think we ought to concentrate on cost-effectiveness measurement, and for the present at least leave benefits assessment to one side.

> '. . . cost-effectiveness analysis cannot be used to decide whether a project is worthwhile or not. Its value is in deciding whether one project is superior to another, or in deciding the best way of allocating a previously determined budget. For these reasons, and because cost and effectiveness are measured in different units, cost-effectiveness analysis is a second best technique; to be used when cost-benefit analysis, the more powerful tool, is too difficult, too expensive or requires unobtainable information . . .'

Because discussion of costs and benefits almost invariably reduces the participants to circular argument and frustration, I am quite content to limit my remarks to the 'second best technique'.

A matrix

When talking about evaluation it can be useful to think in terms of a matrix, in order to clarify the relationships between the key variables. I am endebted to John Martyn of Aslib for suggesting the following schema.

On the horizontal we have three groups for whom evaluation can have slightly different implications in any given situation. These are: the users, management and the sponsor. On the vertical we have cost, effectiveness and benefits. This simple matrix is worth calling to mind whenever the evaluation of information services or systems is being discussed, if only because it forces us to give due attention to the different viewpoints, implicit in any evaluation exercise.

	User	Management	Sponsor
Cost			
Effectiveness			
Benefits			

FIG. 2. *The evaluation matrix*

To give an example of how the grid can be used to articulate the features of a particular situation we might like to think of how the three groups would assess the worth of Prestel in the context of public libraries. As far as cost is concerned the user will no doubt be happy because policy has been to offset the charge against the library's running costs. In that sense the only cost to the user is the cost in time and effort in going to the library, locating the set and accessing the appropriate frames. One other possible cost is the frustration encountered if the system fails to satisfy the user's particular needs. If we think in terms of benefits then as far as the user is concerned it is the possibility of having free access, without delay to current files. From the librarian's point of view the benefits may primarily lie in the fact that significant amounts of manual record checking and file maintenance are no longer necessary. From the sponsor's point of view (and in this example the sponsor might either be the library service management team, or even the local authority itself) the benefits may be of a higher order. That is to say, the 'political' or social impact of offering a new technology to the public may enhance the library service's public image. In a sense, this benefit is not (initially at least) dependent upon the quality and effectiveness of Prestel as a public information medium. When we talk of effectiveness, then the user will tend to make a judgement on the basis of the practical usefulness of the system in providing him/her with information for the least possible effort; information which enables the user to make a decision or value judgement of some kind. From the librarian's viewpoint effectiveness will be assessed by comparing the new delivery medium with traditional reference materials. Comparisons will in theory be made between the relative accuracy, cheapness, currency, coverage and ease of use of the new and traditional media. As far as the user is concerned such technicalities will not be directly or systematically considered, as users understandably are concerned simply with the answers to their questions, not the ways in which these answers can be arrived at. From the sponsor's viewpoint effectiveness might be considered in terms of the overall impact on the kind of service offered by staff. Prestel might, for instance, prove to be a subtle influence on staff perceptions of their role, on their perceptions of themselves as professionals. To be identified with an innovation like Prestel may well do something for staff morale. This added effect may have been anticipated by the sponsors but is clearly not one which directly concerns the user, and may even not be one which librarians themselves were aware of in their initial assessment of the system's potential. This may not be the best example to demonstrate the multiplicity of perspectives involved in evaluation, but I hope it gives you some idea of how an evaluation matrix can illuminate the inter-relationships.

Three levels of evaluation

In his UNESCO Guidelines for the evaluation of information systems and services Lancaster[15] identifies three levels of evaluation:

1. Effectiveness evaluation
2. Cost-effectiveness evaluation
3. Cost-benefit evaluation

The first of these, effectiveness evaluation, is tied up with user needs and demands: the extent to which the system or service under scrutiny satisfies these demands. He goes on to say that evaluation, as we mentioned earlier, can be either macroevaluation (i.e. asking general questions as to the performance capability of a service/system) or microevaluation which is essentially diagnostic in character, that is to say, the critical gaze focusses on particular problems or deficiencies with a view to their eventual eradication. Cost-effectiveness evaluation, number two in the group, relates measures of cost to measures of effectiveness. Number three in his list, cost-benefit analysis, attempts to relate the cost of providing a particular service to the benefits produced by this service. In the context of information systems this almost inevitably means trying to arrive at some money-equivalent assessment of derived benefits. With public services such as libraries, the problem, as we have seen, is even more difficult. Using Lancaster's taxonomy we are for the present concerned only with effectiveness and cost-effectiveness evaluation. And as far as effectiveness evaluation is concerned we will be thinking in terms of microevaluation. The issue of the benefits arising from the operation of a particular information or library service I intend to sidestep. The difficulties in formulating standardized and universally applicable measures with the requisite degree of sensitivity are so seemingly intractable that little by way of practical guidance is likely to emerge. You need only read John Blagden's recent book 'Do we really need libraries?'[16] if you are unconvinced by what I'm saying. Blagden, rightly perhaps, is interested in what it is that happens when the librarian delivers information. He wants to know to what extent cognitive enrichment takes place. He is keen to establish some measure of the disadvantage caused to professionals if information is denied them. He tries to develop measures of impact and penetration in an effort to arrive at an objective evaluation of the worth of information. Not surprisingly, his efforts fail to come up with the sorts of definitive and persuasive answers we might like. This is in no way an indictment of the approaches used, rather is it a reflection of the intractability of the problem. I am not saying that it is impossible to estimate the cognitive impact or educative enhancement brought about by reading or the transmission of certain types of information, but measurement in this area is necessarily imperfect, largely reliant on subjective assessment and the individual's recall, and in addition difficult to carry out. So back to effectiveness and cost-effectiveness evaluation.

Reference services

We begin with reference services. There are two levels of investigation: (a) an analysis of the character and volume of use made of the reference service and facilities and (b) an assessment of the quality, accuracy and competence of the service from the user's point of view. How you decide to evaluate a reference service will to some extent depend on the time, money and staff available to mount the evaluation, but a number of basic steps suggest themselves. One could begin by asking what information needs to be gathered to allow the evaluator to make judgments. For example, you need first of all to know what you mean by a reference enquiry (when is an information enquiry not an enquiry ... what is the minimum level/extent of staff-client interaction necessary before an enquiry can be recorded as a bona fide enquiry), how was the enquiry raised, (in person, by letter, by phone), what was the nature/subject orientation of the enquiry, how long did it take to supply the answer, which sources were used in finding the information, how many staff were involved, what was the total amount of staff time spent on the enquiry, was the library able to answer the enquiry using its own resources?

Once this question-raising process begins it is easy to see that performance measurement involves a wide range of variables and considerations. You will also have noted that I have made no reference to the benefit of the information provided to the user, nor have I suggested that this should be related to the total costs (direct and hidden) borne by the service in trying to provide the user with the relevant information. One approach might be to look at the way in which certain major reference tools are used in the course of the working year by setting up a simple monitoring procedure to record the use of, say, the 10 most expensive abstracting services subscribed to by the library, or the 10 most frequently accessed online databases, or even the use made of the libraries various catalogues and specialist indexes, card files etc. The idea behind this accountancy process is to build up a picture of the extent to which certain key source materials (or at least materials and tools which are felt to be of key importance) are used, how successful they are at providing the desired answers and what the cost in relation to volume of use is. I know for instance that Birmingham Polytechnic Library[17] is currently analyzing its enquiry desk statistics (a procedure shortly to be computerized) and that the Stockholm City Reference Library is looking at the use made of its various card files and indexes to see whether the cost and effort required to develop and maintain a variety of such files can be justified. The principle is elementary, but how many librarians actually test their privately held convictions about the relative merits, utility and cost-effectiveness of different tools? Granted there is additional work involved in instituting the data collection procedures, but this should not be seen as an extra burden, rather as an integral part of the librarian's job. A useful description of how such a process can be set in motion and of its value as an aid to decision-making is provided by Alan Blick,[18] who describes an edge-notched card system for evaluating the performance of the major databases and indexes used in the context of a pharmaceutical information unit. The information provided by his system allows him to create productivity profiles for different search tools, allows him to estimate the relative success rates of the different services used (whether they be of the bought-in or internally-produced variety) and to arrive at a cost-per-hit ratio for the various services under review. In view of the cost of some of the major abstracting services and the variability in the connect hour, royalty and print charges of some databases, such an approach is hardly a luxury but a basic aspect of information management. If you happen to have access to a microcomputer then this is the sort of data which could easily be stored on a small system and used to provide regular management feedback on the performance capability of bought-in and in-house services.

The same approach to measurement applies to the use of Prestel in public libraries. I wonder how many librarians keep a tally of the searches they run on the system, the extent to which they provide the whole answer, the speed with which they retrieve information, the cost-per-search, the extent to which Prestel makes traditional reference stock redundant. You may have a rough idea of the answers to all of these questions, but if the system is being used by a number of staff then there is an even stronger case for systematic record keeping and appraisal. How many reference librarians actually think about alternative ways of indexing their special collections? Do librarians seriously consider the question of the optimum level of indexing, and its relationship to search success? I don't profess to know, but I've never met a librarian who claimed to have used the formula produced by Wessel. Basically Wessel said:

> 'If you want to achieve a probability value P (perhaps 95 per cent) that you will be able to retrieve 3 or more documents in response to clients' needs in specified subject fields, when your collection size in the subject field is a certain number of documents, and time can't be spent searching, it is necessary that these documents in your collection be indexed to an average depth Y.'[19]

If you feel all this is unnecessarily complicated (using a sledge hammer to crack a nut) let us turn to the competence of the service provided by reference staff. I'm sure you are all aware of Thomas Childers'[20] work on what is known as unobtrusive reference testing. This approach, which centres on the correctness and accuracy of information provided by reference library staff, moves away from the internal operations of the reference library and seeks to establish a quality control measure. The practice involves persuading volunteers (or members of the research team) to pose as members of the public and ask a number of short-answer, factual questions of reference library staff. The answers are then analysed, checked for accuracy and variations in depth, quality and correctness. Obviously, this approach works best as a comparative investigation where a wide range of staff will be tested. In one of Childers' studies only 55 per cent of the questions asked received an essentially correct answer. Equally interesting is the corollary of this, namely, the extent to which librarians were convinced of the correctness of the answers they gave. Rothstein,[21] reviewing the literature on the subject, noted that librarians gave high estimates of their success rates in satisfying the information needs of users. Even more interesting is the work of Murfin (reported by Bunge[22]) in which users were followed up and asked whether or not the information they received was what was required. The variation in the opinions of the librarians and those of the users is sufficiently marked as to be cause for concern.

Linked with this is another practice, which has been used in both public and academic libraries, failure analysis. As the term implies the idea is to identify instances of client dissatisfaction (occasions on which the service has been unable to come up with the goods, so to speak) and to work back from these to the causes of failure. In this case it is of course essential to enter into discussion with the user, to probe the reasons for the visit to the library, to find out why the information or materials sought by the user proved unsatisfactory and to arrive at a full understanding of the user-librarian negotiation. It may be that the fault lies with gaps in stock provision, the unreasonable nature of the demand made by the user, the user's failure to adequately explain his/her requirements, a failure on the part of the library staff to understand the nature of the enquiry or properly exploit the resources of the library, or it may be that the librarian was unable to devote sufficient time and attention to the user due to pressure of work. The important point is that quantification of failure is not the only goal, but that through exploring instances of failure and by diagnosing the reasons behind the communications breakdown, steps can be taken to reduce the likelihood of a recurrence.

I doubt if attitudes in this country are sufficiently flexible to make it feasible, but you might like to consider the use of video feedback as a means of evaluating and improving staff performance. Basically, this involves: (a) unobtrusively filming staff in their dealings with users or (b) asking staff to activate the camera to record staff-user interactions so that staff members themselves can begin to evaluate the appropriateness of their non-verbal behaviour in their dealings with the public.

Failure analysis

Having mentioned failure analysis I might as well carry on and look at alternative applications. Obviously, there is no reason why the practice should not be used to assess user-reaction to lending services and the rudimentary information and referral services provided by branch libraries. Again, the first thing is to 'trap' a suitable sample of dissatisfied visitors to the library as they leave the premises. You then question them as to the reasons for their visit and if it emerges that they have not got what they wanted from the library you then begin to explore the nature of the 'failure' with tact and finesse. Alternatively, the approach can be used to measure failure at the shelves. How many readers fail to find (for whatever reason) their chosen book at the appropriate spot on the shelves? Direct questioning can be used to get some idea of the at-shelf-failure rate, or slips can be hung on shelves asking people to make a note if what they were looking for could not be found. Obviously, there will be problems with this approach, and no-one is going to pretend that perfect sampling techniques will be easily applied, but the information thrown up may give insights into ways in which the service could be improved. On a simple level, it should be possible to match lists of items not found against the circulation file, the binding records, etc., in order to calculate the extent to which failure is caused by system maladministration, or by factors effectively outside the control of the library staff. Incidentally, this approach may throw up interesting information about unexpressed demand. It may emerge that certain subject areas are extremely popular but not adequately developed. I think it is important to remember that reservations lists are not a true barometer of demand, and to treat them as such is to get a skewed picture of the nature of demand. A detailed description of how to measure failure at the shelf (in the context of an academic library) has been provided by Urquhart and Schofield[23] and should serve as a useful model for anyone seriously interested in the idea.

Stock management

Having mentioned bookstock in relation to failure analysis it might not be a bad idea to look at some of the work which has been done in respect of bookstock control and development. Book purchasing decisions (when not completely hampered by cuts in the bookstock fund) tend, I suspect, to be based on subjective assessments of quality, suitability, relevance and cost-effectiveness. Clearly, it is a trifle unrealistic and shortsighted to imagine that purchase should be determined solely on the basis of expected high circulation figures. Equally, the notion of the balanced collection has become something of an anachronism. In fact, it may be less than satisfactory to rely exclusively on the judgement of a stock editor, chief bibliographic officer, or even the democratically expressed views of branch and other librarians in the matter of selection. The bookstock is so important an indicator of the quality of the library service that its husbandry would seem to warrant greater attention than has up until now been the case. The difficulty is compounded by the fact that because of the complexity of the situation one is trying to model, the techniques available tend either to oversimplify the entire issue or result in formulae beyond the ready grasp of most practising librarians. It is difficult not to feel that there may be an inverse relationship between the stringency of a given formula and the ease with which it can be applied to operational environments. The early work of Michael Buckland[24] and others at Lancaster University on the management of the University's short loan collection led to many useful insights into the relationship between demand, availability and supply patterns, but the models devised do not seem to have had a great impact on professional practice. The same can be said, only more so I suspect, of the work Morse completed a decade ago. Morse was interested in the question of browsing and considered that it threw up a number of grizzly questions for librarians in control of large open access collections. Morse identified the librarian's problem thus:

> 'The problem is relatively simple for each individual library user. Though his desires may change from visit to visit he needs only to estimate the interest

> potential of books in various parts of the library, in accord with his immediate interests, and then to allocate his search efforts . . . , concentrating strongly on the areas of highest potential. It is quite otherwise for the librarian, for the interests of different browsers differ widely; indeed the interests of the same browser vary widely from visit to visit. Is there anything the librarian can do to improve the success of the average browser?'[25]

Yes, you may well answer. The librarian can split up the collection into broad subject groups (a practice which is vogue in certain public library systems). The only problem with this approach is that it is done on the basis of intuition; on the basis of considered professional judgement. This in itself is no bad thing; at least it shows an awareness of the problems facing the non-specialist library user, but it does not follow any systematic principle. Morse decided that an attempt should be made to provide librarians with a mathematical formula to allow them to arrange their collections (and their catalogues, for that matter) into discrete manageable lumps. Morse's formula aims to tell the librarian what the size of the browsing fraction (in relation to the entire collection) should be to optimize the success of the average browser. It will not tell you which books to purchase, but it should help you structure your collection to best suit your users' needs. Whether the formula has real practical relevance as far as most public or even academic libraries are concerned I would not like to say, but at least it is a notable landmark in the field of collection management. Before moving on from Morse I think it is worth mentioning his attempts to devise a probabilistic model of circulation life.[26] The formulae, again, are not for the mathematically uninitiated and, furthermore, are likely to prove difficult to use unless applied in the context of a large library service with a computerized circulation system capable of generating management data for feeding into the model. The question of book use, particularly in relation to large research libraries, is highly problematical, and, as the much discussed Pittsburg study[27] demonstrated only too clearly, full of pitfalls and interpretative nightmares.

Coming down to earth, as it were, I still think it should be possible for librarians to understand the use made of their collections without having to resort to the sort of mathematics I've obliquely referred to. One crude, dipstick approach might be as follows. Select a Dewey band (say 300–320), go to the open shelves, count the number of volumes in each of a number of predetermined categories (e.g. compendia, elementary, standard, advanced), record the number of issues against each, note the year of acquisition, calculate the mean annual loan rate per volume, calculate the mean rate of issue for each category and compare the number of texts in each category with the circulation performance. This is of course an imperfect measure; (a) it ignores currently circulating material (b) it takes no account of the nature or duration of use made of different texts and (c) it may not be possible to arrive at a complete circulation record for all books. However, this approach may give you some insight into possible imbalances in your selection policy. If, for example, 20 per cent of the volumes in the 300–320 band fit into the advanced category but account for only 4 per cent of total stock use, then you might want to consider whether part of the bookfund might not have been more wisely spent in strengthening those categories which are underrepresented in terms of the extent to which they are used. In a computerized system it might, in theory anyway, be possible to keep a complete circulation record and to create an additional file containing the categorizations of all new stock. Of course, even the process of categorization is itself open to criticism, since it cannot really be standardized. Despite all these limitations, such an approach to stock evaluation is worth considering. The process may be short on reliability, but it should be capable of illuminating major imbalances in the stock size: utilization ratios, where such exist.

Among the public library fraternity perhaps the best known name as far as bookstock research is concerned is that of McClellan, whose book 'The logistics of a public library bookstock'[28] should appeal to, and stimulate the numerate librarian. McClellan's mathematics have been described as a rationing formula which enables the librarian to relate stock availability to subject demand. In all of the approaches I have mentioned the key feature is the attempt to move beyond educated guesswork to establish some sort of reliable basis for manipulating, targeting and refining stock. You may not find an instant solution to your problems in any of the formulae attached to the works I've referred to but you may well find something which suggests an approach suited to your particular conditions. I must say I was pleased recently when looking at the LA Vacancies Supplement to see an advertisement for an Assistant County Librarian's post which specified book selection theory and research as one of three areas into which the post-holder's energies would be directed. Recognition of the need to do something systematic in terms of book stock selection and delivery has come belatedly to the public library world, but at least initiatives are being taken (for example, Surrey's experiments in stock movement and control) and there is real promise of generalizable results.[29]

Computer-held management information

The potential for computer-based profiling of stock use: measuring the intensity of subject use; plotting seasonal variations in patterns of use; and monitoring the borrowing preferences of different user groups certainly is most appealing, but in practice it seems that relatively few libraries make full use of the possibilities open to them. The trend may change, however, if other cooperatives follow the example of SWALCAP (The South West Academic Libraries Cooperative Automation Project) and build in management information capability at little extra cost to the participating libraries. At present SWALCAP offers offline loan analysis and title analysis programs which allow detailed study of patterns of use by subject and by user group. One of the value-added features of modern circulation control systems is the presence of a real-time clock which allows volume throughout to be related to time of day. This has obvious practical value as far as staff deployment is concerned at busy service points, or in the invidious case of a library having to consider reduced opening hours and the likely effect on the users. The management information potential of computerized circulation systems is quite powerful, but not always fully exploited. For example, many libraries at some time or other employ direct mailing tactics to maintain visibility or stimulate fresh interest in the library service and all it has to offer. Few, however, actually seem to monitor the effectiveness of their efforts with any degree of regularity. And yet the whole approach is remarkably straightforward. Coventry City Library Service has, or had, plans to develop a computer-based marketing control strategy by combining its machine readable membership files with the local authority's rent-rate files. In the world of commerce evaluation of this kind would be undertaken as a matter of course, yet, sadly, the library service still does not feel compelled to apply similar standards of accountability to all of its operations.

Document delivery

Talking about bookstock selection and provision leads on nicely to Orr's well-tried Document Delivery Test (DDT, as it is commonly known)[30]. The idea behind the DDT is to ascertain a library's capacity to supply (either immediately, off-the-shelf as it were, or by reliance on document delivery systems) a specified range of items. The first step is to develop a pool of test items (items which are representative of the materials likely to be requested by users of the library service). This done, the investigator then records the time required to make available the various items and calculates what Orr refers to as a 'capability index' of a library's performance. Perhaps the DDT is most useful when a number of similar libraries are being compared; this way relative figures can be obtained and the relative capability of a particular service established. Linked to the idea of delivery is the capacity of a library service to supply journal literature. As far as public libraries are concerned journals will tend to be concentrated in major reference or technical libraries. However, many branch libraries will receive requests for photocopies of journal articles and these along with centrally gathered requests for copies of articles from journals not held in the system can be analysed to give some measure of the extent to which the library service is dependent on external sources of supply. As far as the public library is concerned, it is unreasonable to suppose that it should attempt to aim for catholic coverage and it tends to follow that only in exceptional cases (where the volume of demand is high and sustained) should the library consider subscribing to journals of marginal interest. Obviously, if over the course of a year the cost of inter-library loan forms outstrips the annual subscription cost to a particular journal or magazine, then the library would be advised to take out a subscription. Techniques for analyzing inter-library loan demand have been described, by amongst others, Peter Thorpe.[31] As a rule these case studies are based in special libraries and very much reflect the particular requirements of users in the industrial and commercial sector. However, the librarian in charge of a regional, or large central reference library could do well to look at the library's delivery capability and the 'productivity' of existing subscriptions.

An extension of this is the question of binding policy, storage options and the general extent to which reliance on external document delivery services should be considered acceptable. If a library is short of storage space, if it has large back-runs (which are held voluntarily rather than in response to a local or regional joint-stock holding agreement) then that library should be looking at the comparative costs of discarding non-current items (with the attendant savings on binding costs) and using inter-library lending as an alternative. Librarians, I have heard it said, need to think of what economists refer to as the 'opportunity cost' of following particular courses of action. In this instance the opportunity cost is the loss of the potentially profitable space given over to little used back-runs of journals. The librarian, concerned about effectiveness in resource management, should be considering all situations where viable alternatives to traditional practice might usefully be piloted.

Current awareness services

There have been a number of reported studies on the evaluation of current awareness services. Most of these have been carried out in the special library field, but recently John Martyn[32] conducted a detailed survey of current awareness notifications produced by Leicestershire Libraries and Information Service. Nowadays, it is not unusual for a public library to provide special information services to local government officers. Such services doubtless do good in increasing the visibility of the library service, and, indeed, it may be political good sense to cultivate awareness among one's paymasters. Other libraries provide personalized information services for members of the local council. The information needs of local government are great, and there is much to be done, and much that can be done. For those of you who are interested in this whole topic may I recommend a paper by Alan Peacock[33] of Cheshire Libraries and Museums Department, which appeared in a recent issue of *Aslib Proceedings*. Despite the goodwill which such services may engender the evaluation-conscious manager should still want to look at what he is doing with a view to ascertaining the cost-effectiveness of the constituent activities.

John Martyn's study was designated a study of costs and benefits, and although I said we would not consider benefits I think we can make an exception in this case, because we will not be talking in terms of the library's effect on societal objectives. Basically, what Martyn attempted to do was set the total costs of producing the various current awareness services against the value set on them by the people who used them. This he did, wisely, in two ways: (a) by actually speaking to the users in order to arrive at a rounded impression of how they viewed the services and (b) by asking individuals to quantify (in monetary terms) the value of the bulletins' contributions to their work performance. The value estimates, he concedes, have to be treated with caution—when placing a monetary value on a service individuals tend to be rather more liberal with other people's notional money (particularly their employer's) than they would in practice be with their own. Nonetheless, they provided him with rough cost-benefit ratios for the various services included in the survey.

A not dissimilar approach was used by Kramer,[34] who asked users of a corporate library-information department to estimate the time it would have taken them to acquire the information provided by the library had they been obliged to do so themselves. Although it is advisable to treat the calculations with caution, Kramer's estimates of the man hours (not to say years) saved is singularly impressive. Another possible approach to estimating the worth of specialist services might be to cost various types of reference enquiry (building in an element for indirect costs) and to follow this up by asking individual users if they would be prepared to pay the going market rate for the information they were seeking—the market rate in this instance would be the cost calculated on the basis I've just outlined. To return to current awareness bulletins, I should just say that there are a number of manuals available for anyone keen to evaluate this particular type of service. In particular, I would cite a recent report by Mullings[35] and an interesting, descriptive article by Alan Blick.[36] For anyone interested in a large-scale study of this kind, the Mullings report includes detailed guidelines on data analysis via SPSS (Statistical Package for the Social Sciences).

Technical services

At the outset I made the point that efficiency and effectiveness were two quite separate things, but I don't think we should ignore the fact that improvements in efficiency may well have a bearing on the future effectiveness of a service. For example, if a library can improve the efficiency of its reservation procedures (through staff training, through the introduction of a more sophisticated trapping procedure, or whatever . . .) then the user should experience an improvement in the quality of the service provided. Arguably, improvements in technical services can also lead to a qualitatively better service from the user's point of view. For this reason, I think it is worthwhile to draw your attention to some of the work which has been carried out in the area of technical service cost studies. One measure which has been used is the TSCOR (Technical Services Cost Ratio) described by Tuttle in the following terms:

> 'TSCOR is a ratio made up of the total cost of technical service salaries divided by the amount spent for library materials during a given period of time. This ratio expressed in decimal form is the amount which it costs in staff salaries to spend one dollar for library materials, including the whole process from the ordering of the book until it is ready to be placed on the shelves for the patron to use.'[37]

A practical application of the technique has recently been described by McElroy.[38]

Derived value

Another technique, moving away from the area of technical services assessment is that of derived value estimation. The concept was developed by Wills and Oldman[39] in their study 'The beneficial library' and, again, has recently been applied by McElroy[40] in a real world situation as one means of assessing the overall performance of a special library. The technique is based on a very simple equation:

$$DV = 1 - \frac{(\text{Expectations} - \text{Perceived Actualisation})}{\text{Expectations}}$$

where DV is what the authors refer to as derived value (i.e. the difference between what was expected of a service and what was in fact perceived). The closer the value of DV to 1 the more successful a given service is in terms of its ability to meet the needs of its users. Obviously, the application of the technique is dependent on the participation of a representative sample of users of the service under investigation. It is not a measure which can be trialled independently of user cooperation, and as such demands considerable effort from the librarian. On the credit side, it does furnish useful feedback on satisfaction levels within the user community.

Large-scale evaluation

Important though it is to encourage the spirit of evaluation among practitioners, there are occasions on which evaluations of general interest and relevance are best conducted by outside agencies. A case in point is the catalogue. Of course it is important that user reactions to different types of catalogue are documented and that librarians develop an understanding of the factors which inhibit use, but that does not mean that essentially similar studies need to be carried out in libraries up and down the country. As far as the catalogue is concerned, quite a lot is already known about user preferences and behaviour. The Bath University Comparative Catalogue Study[41] produced a wealth of information on user reactions to different types and formats of catalogues, and there therefore is little justification for replicating experimentation at the local level. In-house evaluation studies should, in the main, aim to explore aspects not fully covered by national or large-scale studies, or they should draw on the findings of such studies to throw extra light on peculiarly local features.

Marketing the library service

When we talk about the application of marketing principles and practice to the management of library and information services we are in fact talking about an approach or service philosophy which takes the view that service is primarily concerned with maximizing user satisfaction. And so it should be, you may retort, but I think it is true to say that it has only been in the last few years that librarians have begun to take note of marketing theory and practice. I mention this, not because I have any particular desire to go off at a tangent, but because a marketing approach to management necessarily entails an understanding of organizational objectives and a willingness (a) to identify user needs (b) to implement policies designed to increase user satisfaction and (c) to evaluate performance.

Some of the performance measures we have looked at can be used without reference being made to the user (e.g. the Document Delivery Test, or the TSCOR), while others can only be employed if user cooperation is first obtained (e.g. failure analysis, or estimation of derived value). Much in the way of basic evaluation work is dependent upon a knowledge of one's user population, its basic characteristics, attitudes and preferences. It is therefore not unreasonable to suppose that attempts at evaluation should start with an analysis of the user population, if only to see to what extent the library service's impressions of the population it is serving correspond to the demographic actuality. At this level evaluation calls for the sort of introspective honesty normally reserved for moments of critical self-doubt. And yet it is important that we challenge our preconceptions about the sort of service we offer, and the sort of people to whom we offer it. Not only that; it is important that we look into the organization's image of itself. It is not impossible that the dominant self-image is far removed from the impression held by the public-at-large.

There has been no shortage of user studies in the field of librarianship, if anything there has been an uncritical acceptance of their value and a failure to view the user study as but one aspect of the overall marketing plan. The information derived from a user study is in itself inert, i.e. unless it is acted upon to bring about change in the existing system, then it is effectively worthless. In the wake of the user study should come a policy review period, an action programme and, most important, a formal evaluation of the effects of change. In the final analysis, the user study will only have been worthwhile if the results of the evaluation exercise confirm that the changes made in the service have resulted in increased benefits to the user. The adoption of a marketing approach to management indicates a willingness to evaluate the credibility of existing services and relate future practice to the principle that the needs of the user should be paramount in the formulation of a service's objectives. The Hillingdon study[42] popularized the notion of unexpressed need and helped shift professional attention away from demand-based analysis of service patterns. This gradual change in attitude, which has been a hallmark of the past decade or so, is reflected in a number of experimental approaches to stock selection, stock delivery and in more proactive approaches to service generally. These changes are essentially due to the growing realization that service should be shaped by user needs and demands rather than librarians' interpretations of what these needs might (or even should) be. In a sense, it is at this stage that evaluation really begins, because in critically examining and questioning the precepts which underpin traditional modes of service we are in fact evaluating the broad suitability of the service we offer. Out of this self-investigation should come the sort of objectives-driven programme we talked about earlier, into which would be built a continuous process of evaluation and assessment based on the sorts of measures I've described.

Summary

In this paper I have concentrated on the practicalities of evaluation, though all the while stressing the need to see evaluation in the context of Management by Objectives. I have not attempted to consider how the library might go about measuring its effect on societal objectives, nor am I particularly interested in Hamburg's[43] concept of exposure as the only universal measure. I do however agree with Hamburg that 'exposure of individuals to documents of recorded human experience' (in the generous terms of his definition) is the 'sine qua non of library activity', but I still have to be convinced that the concept could have real practical significance for librarians. I don't know how many angels could stand on the point of a needle, nor do I know what the 'objective' or 'purpose' of the public library service is, but I do know that useful information can be gathered by using some of the performance measurement techniques I've touched on in this paper.

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Centralization and after: A review of the prospects for distributed processing in libraries

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Introduction

THE LAST FIFTEEN YEARS have seen vast developments in the computerization of library services and with these developments have come a number of organizational changes. A predominating feature of this period has been a tendency to centralize both human and technical activity. It is still widely assumed that in common with other areas of library services cost effectiveness will dictate a continuation of this trend. However the cost of systems is decreasing and their power increasing so rapidly that it is possible for quite small library budgets to sustain computer activity of some sort. More importantly, local area networks are becoming available commercially which combine the advantages of distributed processing with centralized activities where appropriate. Library managers now face yet another challenge in how they run their computer services and the following paper explores some of the issues involved.

In principle the process of centralization seems quite simple, being a straightforward removal of all or part of an activity to some common location. The practice is however much more complex and the manifestations of centralization many and diverse. It can take place at different structural and technical levels and can have far-reaching personal, organizational and technical implications. During the process, identical or disparate activities which were previously dispersed may be collocated, new departments established, investment diverted, people moved, and their jobs transformed. In short, depending on the degree of centralization the whole nature of a library's organization and its position in relation to institutional, commercial and national structures can be changed.

It might be argued that the sorts of factors mentioned above are merely the effects of computerization itself, that centralization is a symptom, not a cause. It is true that early batch based systems imposed severe constraints on library workflows whether in the provision of cataloguing or circulation services and a degree of centralization has been necessary for job scheduling and data control. However the amount of centralization also depends on the flexibility of the system, management style and structure, and personal abilities, and it is interesting to observe how the tendency to centralize has been carried forward into the online environment. Yet the online environment, provided that a number of managerial and technical conditions can be met, ought to be offering the prospect of greater distribution of activities and processing as a matter of policy. The balance between distribution and centralization

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in library systems is delicate and a matter of some controversy as suppliers and cooperatives have made heavy commitments in one direction or the other.

Early developments

Stories abound from the early years of library computerization in the late sixties and early seventies of computer managers (and librarians) who grossly underestimated the processing loads involved in library data processing. In fact it was soon realized that libraries posed severe problems in a number of applications. In cataloguing, for instance, a combination of generously flexible record structures and rapid accumulation of data placed heavy demands on storage and processing resources. In any case libraries were compelled by the sheer capital cost of computing to share resources with other users which meant obtaining time on machines primarily intended for other purposes, usually research and finance. A surprising number of batch mode circulation systems were implemented in this way, given the limitations of batch mode operations in dynamic applications. The removal of these processes to computing centres imposed different working routines in libraries and was accompanied inevitably by centralization of a range of professional and clerical tasks.

The limitations of batch mode systems were alleviated by the appearance in the mid-seventies of online systems but it was immediately clear that there were still problems with timesharing. Research machines often had official limits placed on the amount of non-research work allowed whilst administrative computer managers when under pressure always seemed to allocate a higher priority for example to processing of the payroll than to maintaining a circulation system in real-time. The benefits of online working would only be realized with the introduction of dedicated machines and as dedicated machines were still excessively expensive for individual libraries, the first cooperatives operating in real-time were implemented.

Centralization of systems

The appearance of the co-operatives is the single most important stage so far in library computerization in Britain. They raised the level of development from that of local, idiosyncratic and hazardous enterprise and put it on a thoroughly professional footing. They built on the pioneering work of individual projects and with the invaluable support of the British Library Research and Development Department produced results which would have been impossible in isolated projects. In practical terms they also introduced a new level of centralization based on technical conformity cutting across familiar groupings of region or institutional type. Cataloguing has understandably been the prime candidate for centralized treatment by the co-operatives because of the benefits deriving from economies in storage, exchange of MARC records and output processing, but circulation services on a remote computer have also been operated very effectively.

The co-operatives are not the only agents in this process of change. The British Library itself operates a cataloguing service, LOCAS, on a batch bureau arrangement but more importantly, and quite rightly, is conducting discussions at the national level on the ultimate central resource, the national database. Exactly what form that will take remains to be seen for there are immense financial, political and technical problems involved. However it is important that the pressure for the early publication of a cohesive plan for the national database be maintained as somewhat paradoxically, it would be an essential element in developing effective distributed library and information systems.

Distributed systems

Despite the powerful centralizing trends I have described there is an equally powerful underlying assumption amongst librarians that it is ultimately desirable to maximize the processing power and data storage available in-house in the library or information unit. This is partly derived from a natural aversion to relinquishing control to a remote and perhaps mysterious body and partly to a prevalent belief, perhaps contrary to performance statistics, that remote processing is inherently more unreliable than in-house operation. But there are also a number of quite valid reasons for promoting distributed processing.

Cost is of course a predominant factor. The concept of distributed processing relies on the proposition that low cost devices will be available to support local activities. The attractive feature of recent networking techniques is that processing power or storage may be acquired incrementally according to increase in activity or addition of functions rather than investing in spare capacity for future expansion as is often the case with centralized systems. Centralization also implies a degree of conformity which can cause difficulties both in the short term and the long term. Regarding system features the centralized approach provides a generalized package which may not satisfy the buyer's perceived requirements or specification. There are signs that fewer librarians now have unrealistic expectations of computer systems and that many are willing to sacrifice individual requirements for other advantages of a tried and tested system, but problems do arise when library staff are expected to adapt their practices and services or accept something which is 'not quite right' or even second best as they see it in their particular application. In the longer term most centralized systems have the self-imposed conformity of bibliographic standards. The advantage of input standards is that data created by one contributor may be happily adopted by another. The disadvantage is that they are costly to maintain both in staffing and computing resources and there is a danger that they become an end in themselves. There is evidence now to suggest what many reader orientated libriarians have long suspected, that much data contained in catalogues is of no interest to the searcher and may even impede retrieval. It may be that library staff and readers have such different requirements of catalogues that separate provision will be made. The increasing availability of low cost computing and distributed systems will almost certainly be accompanied by a reappraisal of the role of bibliographic standards, or rather of the contribution of the individual library within the national structure.

The extremes of the spectrum of distributed processing are represented by the stand-alone systems and certain types of co-operative system. In a stand-alone system the librarian as manager is responsible, leaving aside the contractual obligations of the supplier, for the whole operation of the system. This will cover specialized staffing, technical operations and control, performance, maintenance, data security, software support and development. In a centralized system typified by the co-operatives most or all of these activities are handled or supported by central staff in return for an appropriate contribution to costs. There is however an almost infinite range of intermediate levels and compromises between the two extremes and the development of distributed processing will require a constant adjustment in the allocation of control and access.

Stand-alone systems and co-operatives

Stand-alone dedicated online computer systems have recently come within the budget range of individual libraries and library authorities, which is of course the result of the dramatic and continuing reduction in the cost of computer hardware. Powerful minicomputer systems offering a wide range of circulation facilities have been sold by ALS to public library authorities and by GEAC to academic libraries. A new Plessey system aimed at large local authorities has been launched and seems assured of substantial sales on the basis of its existing market share in batch based systems. Although these commercial suppliers have probably gained a stable foothold in the library market, the systems they offer still require a very substantial initial outlay and while this should not be an insurmountable problem for the large public authorities it will still present difficulties for most academic libraries where sums of anything over £100,000 are involved. One notable effect is that library groupings not at present in membership of a co-operative now seem prepared to invest in a commercial stand-alone system on a co-operative basis. High capital costs will not always be the rule and already one supplier, Telepen, has marketed successfully a low cost circulation system of limited scope based on a microprocessor linked to RAM memory. Clearly the rapidly increasing power of the microprocessor coupled with decrease in cost of mass storage devices holds the key to relatively low cost distributed processing for libraries. This prospect only reflects the established trend in the business and research worlds. The problem with library housekeeping systems compared with business systems as far as the commercial supplier is concerned is that the potential market has been much more limited and return on investment more uncertain. Library data processing has in fact turned out to be a veritable minefield for a number of firms, for which the library profession must take a certain amount of responsibility in that quite unreasonable and in the end unnecessary demands have been made on system specifications and too little attention paid to managerial aspects such as data security and system performance. This was usually a result of the fact that planning and liaison tended to be carried out by enthusiasts at a relatively junior professional level while senior managers lacked the expertise or commitment to become sufficiently involved.

On the whole the commercial market for present stand-alone systems seems firm if somewhat slow and it is likely that UK libraries will continue to provide a limited number of upmarket suppliers with sufficient business in housekeeping systems. It is most encouraging that a few companies have been able to make the successful transition from one-off customized systems to more generalized packages on a competitive basis with the non-commercial sector. The potential market for library and information systems is however much greater than that being exploited at present. Hardware costs will continue to fall and markets will expand as numerous libraries and information units move into information technology and provide the necessary return on investment involved in developing new generations of systems.

Despite the strong challenge of stand-alone systems the co-operatives continue to flourish. This is partly due to a remarkable product loyalty shown by existing members coupled with an enthusiasm for encouraging their colleagues to join, and partly due to the momentous consequences of changing systems. Equally important however has been the readiness of the co-operatives to face up to the inevitability of distributed systems, and to provide an orderly development path through new technology. BLCMP is in the process of developing a circulation system which will stand alone but benefit from central software support and transfer of bibliographic data. OCLC, which is entering the British market with its highly centralized cataloguing and interlibrary loan facilities, promises distributed online catalogues and circulation. UTLAS is exploring the possibility of progressing towards distributed systems through its 'replicated system' approach. SWALCAP, also highly centralized, is actively discussing distributed online catalogues and acquisitions systems. The co-operatives with their experience of telecommunications and integration of applications are undoubtedly in the best position to lead the way towards distributed systems. However it is likely that the commitment in terms of investment will lag some way behind the technical feasibility and it is quite possible that in the next generation of systems the commercial sector will make the running.

The development of distributed systems is also of interest to the publishers and booksellers. Experience with teleordering has prompted a number of library suppliers to offer online order systems such as Bookline. Clearly booksellers will attract a greater proportion of a library's business if they can provide a more sophisticated and rapid service by direct access. The library could benefit further by being able to extract and process at an early stage bibliographic data which is not otherwise available.

Conclusions

Quite apart from the natural aversion to centralization which I mentioned earlier, the continuing reduction in hardware cost of processing and storage renders the movement towards decentralization inevitable. Software costs are of course a great problem and far outstrip hardware considerations but a few companies have proved that they can overcome this difficulty on the older technology and doubtless they or others will do so on the new. In terms of microprocessors, library housekeeping systems are quite a different proposition from electronic office and word processing applications and many experienced library data processing professionals are rightly sceptical about extravagant claims made for microprocessors in their field, but the fact remains that cost-capacity ratios are improving rapidly and when implemented successfully microprocessor based systems will transform the economics of library systems. There is however a range of requirements that must be met in the course of these developments, requirements which are no more than good data processing management practice. Low capital cost cannot justify ignoring the fundamental importance of data security, software support and development, enhancibility, compatibility and the provision of an orderly development pathway.

The continuing development of networking techniques shows great potential for making the most of local processing power whilst providing access to centralized facilities when necessary. Local area networks which have until recently been confined to academic and research environments are now available commercially, notably the Cambridge Ring and Ethernet. In the library context such a network could offer

The U.K. library networks and the Co-operative Automation Group

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The activities of the five U.K. library networks which are represented on the British Library's Co-operative Automation Group (BLAISE/LOCAS, BLCMP, LASER, SCOLCAP and SWALCAP) are briefly described. The relevance of CAG and the networks to the Aslib membership is considered.

Introduction

HUNTER AND BAKEWELL define a library network as 'a group of libraries and/or information service points connected together for the purpose of satisfying specified requirements.'[1] They suggest that the modern network has three objectives: to reveal the contents of a large number of libraries or publications; to make the resources thus revealed available to individual libraries and individual users when and where they need them; and to share the expense or the work involved in making these resources available so as to reduce the rate of increase in cost to individual libraries and users.[2] Burkett has provided a comprehensive guide to library and information networks in the United Kingdom[3] and Alan Seal, of the Centre for Catalogue Research at Bath University, has produced a most useful directory of the cataloguing activities of the U.K. networks—a directory which would have been even more useful if the compiler had thought of providing an index.[4]

There is a tendency to think of the networks as being *only* concerned with cataloguing; indeed when I was asked to write this article the request was for an article on 'the cataloguing co-operatives'. This tendency is probably inevitable because it is the cataloguing record which usually forms the basis of the other activities of the networks such as circulation control and inter-library lending. It is worth recalling that the oldest regional network to be described in this article, LASER, began life as an organisation for inter-library lending and its cataloguing activities have been added comparatively recently.

The largest network in the world, with a membership of well over 1000 library authorities in the United States and a growing membership in Europe (including Newcastle-upon-Tyne and Essex University Libraries) is OCLC Inc. (formerly the Ohio College Library Center). This article is only concerned, however, with the organisations in membership of the British Library's Co-operative Automation Group—BLAISE/LOCAS, LASER, BLCMP, SWALCAP and SCOLCAP.

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BLAISE

At the hub of cataloguing and information retrieval activities in Britain is BLAISE (the *B*ritish *L*ibrary *A*utomated *I*nformation *SE*rvice), an online information retrieval and cataloguing system which allows a wide range of databases to be searched. As well as U.K. MARC files from 1950 and Library of Congress MARC files from 1968, it is possible to access via BLAISE all the files originating from the National Library of Medicine in the United States (MEDLINE, SDI-LINE, CHEMLINE, TOXLINE and the MeSH Vocabulary File). The most recent addition to the online database is *British Education Index*.

A feature of BLAISE is search flexibility. It is desirable to search on the control number (i.e. International Standard Book Number, BNB number or Library of Congress Card Number), since that is a unique number identifying only one book, but it is possible to search by author, title words, subject information (classification notation or subject terms), publication date, country or form of publication.

A BLAISE service which may have particular appeal to special libraries is the Selective Record Service, which covers both UK MARC and LC MARC files. This permits libraries to submit requests for individual records or sets of records to the British Library's centrally held database, thus dispensing with the necessity for individual libraries to build up and maintain large files of MARC records, many of which are of no interest to them. Records may be selected offline by quoting the official control number (the ISBN or BNB serial number for British records or the Library of Congress card number for LC records). For online selection, records can be selected from the MARC files using the ELHILL software and either the official control number or any combination of other search keys necessary to identify the record.

LOCAS

An integral part of BLAISE is LOCAS (*LO*cal *CA*talogue *S*ervice), introduced in 1974, which offers a complete cataloguing service from data preparation to catalogue output for those libraries which want to take advantage of a centralized system. For each participating library, LOCAS maintains a local MARC-based catalogue file consisting of centrally produced UK and LC MARC records and locally created records for material which is not available from the British Library database. Libraries may add local data, such as locations, to the records which they select for their file and they may also choose to amend standard MARC fields to suit local practice. The file is processed monthly to produce an updated catalogue, normally on microform. Libraries specify the kind of catalogue required, the number and type of entries and the filing and layout of entries. The keynote of LOCAS is flexibility—a reflection of the responsiveness of the Library Software Package to profiles for individual libraries—i.e. the translation of each library's bibliographic requirements for a catalogue into machine terms.

Most LOCAS subscribers (70 in November 1981) are autonomous libraries operating on a totally individual basis, but centralized services are also provided for libraries operating as a Group—including sixteen members of SCOLCAP, nine members of the University of London's co-operative scheme and ten members of the ILEA (Inner London Education Authority) scheme. The government libraries are also members of the government libraries' own co-operative scheme, INTERLIB, but choose to be serviced by LOCAS as individual customers.

The co-operatives receive a union catalogue in addition to the catalogue sequences required by the individual members. One advantage of LOCAS subscription to a co-operative member is access to the EMMA (*E*xtra-*M*arc *MA*terial) data created by other members. Another is that union files are maintained in a different way from those for other users, so that records can be upgraded according to priorities set by the co-operatives—for example, CIP (Cataloguing-in-Publication) records are automatically upgraded, after publication of the book, by a full UK MARC record.

Individual libraries, and each library within a co-operative, are assigned a library analyst responsible for the initial implementation and training of the library and then for subsequent support on a daily basis. In the union system an important body is the Co-operative Co-ordinating Centre, which works closely with the Customer Support Group of BLAISE to ensure overall smooth running of the service and that the needs of the co-operative as a whole are considered. The Co-ordinating Centre also sets the cataloguing standards of the co-operative and has a consultancy role for new members.

The cost of LOCAS depends on a number of factors, such as the number of items catalogued annually, the proportion of catalogue records amended each year, the number of catalogues produced and the frequency of production. BLAISE staff will discuss an individual library's requirements and provide an estimate of the charges likely to be incurred.

LASER

LASER (the London and South Eastern Library Region) began life in the 1930s as SERLS (South-Eastern Regional Library System), but the system as we know it today dates from 1970. It is an organization for library co-operation within Greater London and the counties of Bedfordshire, Berkshire, Buckinghamshire, East Sussex, Essex, Hertfordshire, Kent, Surrey and West Sussex. Its objects are the improvement of library facilities available to the public by the promotion of co-operation between member libraries and other bodies within or outside the area of the region having functions relating to libraries. Membership is open to all types of libraries.

LASER's union catalogues provide access to its member libraries' stock of over 40 million volumes. LASER also operates a transport scheme for interlending in London and the South-East and is a Prestel Umbrella Information Provider for community information on a national basis.

The LASER minicomputer system, installed in 1977, provides access to 1.23 million bibliographic records which represent the member libraries' stock of more than 40 million volumes. The system provides access to the complete UK MARC files (1950 to date), the LASER retrospective EMMA file (post-1900, authors A-HE), the LASER EMMA file from 1977 to date, and the LC MARC file for books acquired by LASER libraries. Access to the records is possible by author, title, combined author/title, or book number (ISBN, BNB serial number or LASER number for EMMA).

One of the original design requirements requested by members when the minicomputer system was being planned was that it should provide the means for future service enhancements, and during 1978 several members asked to be linked to the LASER minicomputer system for interlending and reference purposes and for current cataloguing/retrospective conversion services. LASER was already providing its members with retrospective catalogue records as a result of the conversion of its union catalogue into machine readable form, and the provision of a current catalogue record service was a logical development.

LASER has been supplying the BBC (which is a SWALCAP subscriber) with an experimental interlending and bibliographic reference service since February 1981. As a result of the success of this service and the consequent demand from other members, a network with dial-up facilities, in addition to the leased lines already on offer, is now available to members.

Microfiche copies of the LASER database to 1980, author sequence, are available for purchase at £700 and supplements are planned. Members who subscribe to the online service for interlending receive a free copy of this microfiche.

LASER's future plans involve the pragmatic use of the existing minicomputer system in conjunction with the mainframe programs currently available to LASER (LIBPAC). It is considered that this will provide a library with the record availability, rapid searching and online techniques achieved by the minicomputer and the processing and sorting of data best achieved by the mainframe. Hertfordshire, Bromley and Essex are among the libraries which have expressed interest in the Selective Record Service which is being developed.

The LASER/LIBPAC full cataloguing service comprises selection of MARC records from the 1950–1982 database, carried out on a monthly basis; addition of selected MARC records to the database, with any locally generated records and corrections to records already on file; formatting and sorting of entries into two separate output sequences, as agreed with the subscriber; and outputting sequences on COM (fiche or film). Data preparation is the responsibility of the user, but LASER will arrange this if required (at a charge, of course).

LASER's charging policy is based on the estimated annual intake for the current year; the file size at the start of the year; any extras such as additional sequences; and a standing service charge to cover administration, stationery, delivery, etc.

BLCMP (Library Services) Ltd

BLCMP began life in 1969 as the Birmingham Libraries Co-operative Mechanization Project. The first co-operative automated cataloguing service in the United Kingdom, its membership consisted originally of three libraries only (the Universities of Aston and Birmingham and Birmingham Public Libraries). It now has 34 member libraries in various parts of the United Kingdom and one in Denmark (Aalborg University) and its services now extend beyond cataloguing to include an online acquisitions service and a circulation control system (CIRCO), which incorporates all the functions associated with the issue and return of books including the provision of management information.

Three bibliographic files are held: the LC Potential Requirements File, containing all LC MARC records since 1972; the BNB Potential Requirements File, containing all UK MARC records since 1950; and the Union Catalogue File, which includes a large number of co-operative libraries' EMMA records for books, serials, music and audio-visual materials. Records may be retrieved by control number only (preferably ISBN but alternatively LC number, BNB number or BLCMP number).

As well as accepting AACR as a cataloguing standard, member libraries conform to agreed transliteration practices and to the BLCMP filing rules.[5] They may choose to receive 5 by 3 inch catalogue cards or to have a complete catalogue in either book form (typeset) or microform (film or fiche). A union 'name' catalogue, covering the holdings of all BLCMP libraries, is produced monthly and this can be used for co-operative acquisitions, inter-lending and finding control numbers for new books. There are separate monthly union catalogues for books and serials. Classified catalogues are produced by Dewey, Library of Congress, UDC and the British Catalogue of Music Classification, and libraries may, if they wish, receive a subject index produced by chain procedure.

The BLCMP On-line Support Service (BOSS) provides comprehensive online cataloguing, searching and acquisitions services. There is a Selective Record Service and BLCMP can arrange the supply of microfiche readers and other services to members at preferential rates.

Since 1978 BLCMP has been responsible for the production and distribution of the British Library BNB printed card service.

In the spring of 1982, BLCMP took delivery of an IBM mainframe computer with 4500 megabytes of disc storage, which will cater for even the most phenomenal growth during the next five years. The aim is to secure the benefits of the latest technology while improving the individual member's freedom to accommodate local special needs, thus introducing increased individual library control over bibliographic information in catalogues while at the same time ensuring that members get their computer based services at the most competitive costs possible.

BLCMP's charging structure consists of one set of charges for current cataloguing and another set for retrospective conversion. For current cataloguing there is a base charge for libraries acquiring up to 5,000 unique titles per annum and an additional charge for each unique title over 5,000. For retrospective cataloguing there is no base charge but each unique title catalogued is charged separately. Libraries may also purchase the union name catalogue, serials union catalogue, music union catalogue and cross-reference file. The ancillary services—Selective Record Service, Current Accession List, subject indexes, general search program, catalogue prints and catalogue cards—are charged separately, as are BOSS and the Circulation Control Service.

SWALCAP

Like BLCMP, SWALCAP (the South West Academic Libraries Co-operative Automation Project) began in 1969 with the support of a grant from OSTI (the Office for Scientific and Technical Information, later the British Library Research and Development Department). Its membership consisted in March 1981 of ten univesity libraries, five polytechnic libraries, the College of Librarianship Wales and the BBC Reference Library.

SWALCAP's aim is to provide integrated computer services for library housekeeping purposes and to keep these services, by a process of regular review, in line with technological developments as and when these become economically viable.

SWALCAP's circulation service has been in operation since 1976 but has undergone considerable improvements since that date. A library using the service must have its own minicomputer in order to have the necessary fallback arrangements for periods of fault. A specially adapted Telepen terminal is used for data capture of bar-coded book and borrower details and there is an alternative version for use in conjunction with a visual display unit. The system caters for up to ten branches, up to ten different types of material and up to seven categories of user.

The present cataloguing service has been in use since May 1978. As with the circulation service, the chief principle governing the design of the cataloguing service has been that of flexibility of use, offering a variety of processing options at all stages of the cataloguing cycle. The system is MARC-compatible and SWALCAP encourages co-operation and a unity of approach among its members, but there are very few constraints upon the activities of individual libraries and catalogue entries may be as brief or as full as each member library considers appropriate. Output may be on COM, cards or paper, depending on the needs of the individual library, and all or any of the following records are available: union and/or branch catalogues (name, classified, title, dictionary, subject or KWOC); subject index; serials catalogues; reference authority; ISBN lists for regional bureaux; cards for reporting holdings to national union catalogues; and accession lists. The frequency of all forms of output may be varied individually and supplements may be maintained for COM catalogues.

A permanent link between the SWALCAP networks and the BLAISE network allows any SWALCAP member to access the BLAISE database via any of their terminals. Future developments include improvement of the online facilities and extensions to the system to cater for acquisitions functions.

Members are charged in direct proportion to the amount of computer time used to process their data, the processing charges being made up of three elements: batch processing charges, online transaction processing charges, and online printer output charges.

SCOLCAP

SCOLCAP (the *SCO*ttish *L*ibraries *C*o-operative *A*utomation *P*roject) is the youngest of the U.K. library co-operatives. It developed from a conference convened by the Librarian of the National Library of Scotland in June 1973. This conference set up a Working Party, consisting of representatives of the National Library, three university libraries (Dundee, Glasgow and Stirling) and two public libraries (Edinburgh and Glasgow), and SCOLCAP's activities began, with the financial support of the British Library Research and Development Department, in 1976. By November 1981, the membership had grown to 21 libraries, and it is expected that this number will increase to 40 over the next few years.

Members are kept informed of developments via *SCOLCAP Newsletter*. Issue number 4 of this was a particularly interesting one, containing the proceedings of a one day seminar held in February 1978.

In 1981 SCOLCAP acquired a Hewlett-Packard 3000 series 44 computer and terminals linking the system to various sites throughout Scotland and Northern England. Each terminal is capable of inputting and displaying the very wide character set required by SCOLCAP member libraries. A comprehensive and sophisticated software package for online acquisitions, cataloguing, information retrieval and management information was tested and the SCOLCAP libraries began to use the system 'live' in March 1982.

The SCOLCAP database will provide immediate online access to the most recent UK MARC records; all SCOLCAP EMMA records; all order information; the combined catalogue holdings of all member libraries; an authority file of authors; and an address list of book suppliers.

A permanent online link to BLAISE is being implemented, and this will form the Potential Requirements File for data on the SCOLCAP database. The BLAISE/LOCAS system produces COM catalogues for each library from data input by the computer.

The Co-operative Automation Group

It was clearly desirable to have some means of co-ordinating the work of the co-operatives, with a view to planned development, and at the beginning of 1980 the Co-operative Automation Group (CAG) was formed under the auspices of the British Library. The members of the Group are the Chief Executive of the British Library (Chairman); the Director General of the British Library Bibliographic Services Division; the chairmen and executive directors of BLCMP, LASER, SCOLCAP and SWALCAP; the British Library Bibliographic Services Division's Director, Automated Services; and one member each nominated by Aslib, the Library Association, SCONUL (the Standing Conference of National and University Libraries) and COPOL (the Council of Polytechnic Librarians). In 1981 a representative of the British Library Lending Division was co-opted in order to provide a link with the British Library's Ad Hoc Working Party on Union Catalogues, which has the following terms of reference: (i) to examine the purpose and scope of existing union catalogues from the general to the special; (ii) to consider the implications for union catalogues of developments in library automation; and (iii) to suggest possible future patterns for union catalogue provision and how they might be maintained.

CAG's terms of reference are to seek to ensure the most effective articulation of the services provided by the British Library and the library automation co-operatives, and of the plans for future development of these services, by: (i) identifying major policy, technical and other issues affecting the planning and interaction of the services; (ii) recommending actions or studies required; and (iii) carrying out or, where appropriate, commissioning work necessary to provide a firm basis for future developments. Two Working Groups have been set up, one dealing with bibliographic standards and the other with access to the national database.

CAG, the networks and the Aslib membership

Do CAG and the library networks have any relevance to the Aslib membership? This is something which concerns me very much as the person who is supposed to represent Aslib's interests at CAG meetings. Certainly some Aslib members subscribe to the networks, but the public libraries, university libraries and polytechnic libraries have their own voices on CAG in the persons of the representatives of the Library Association, SCONUL and COPOL. What of the special libraries? Some of the larger ones, such as the BBC Reference Library and the major government libraries, are members of the co-operatives, but they are in the minority.

Special libraries perhaps believe that the networks are not for them because of the uniqueness of their stocks. They would possibly contribute more to a network in terms of inter-library loans than they would gain from it, but I do not know of any special library which has never had occasion to borrow from another library at some time (as is demonstrated by the annual reports of the regional library bureaux). They could save an awful lot of time spent on original cataloguing, thus freeing staff for other work, and the availability of the selective record services means that they need not be overwhelmed by irrelevant records.

Some special libraries feel that cataloguing is an expendable activity which need not concern them—something which came out very clearly when the Library Association Industrial Group felt unable to contribute to a Cataloguing and Indexing Group enquiry concerning training needs for the implementation of the second edition of the *Anglo-American cataloguing rules*—the use of which is an essential prerequisite of membership of a co-operative. I have never been able to understand this attitude. When I was a special librarian I always found that a reliable and up-to-date catalogue was absolutely essential if I was to do my job properly.

Ian Lovecy has pointed out that the organizational effects of membership of a co-operative can be most stimulating. 'One cannot tie oneself with telephone cable to Bristol, Birmingham or a BLAISE mode and expect to bumble along in the same way; all routines will need examining, and many will need adapting or scrapping. Out of the muddle will come a library better adapted both to serve the needs of its users and (more importantly) to change as those needs alter.'[6]

AUTHOR'S NOTE

My appeal to Aslib members to give me their views on the networks and on the activities of CAG in the July/August 1981 issue of *Aslib Information* produced a nil response. My hope is that those of you who have read this article will be encouraged to tell me how best you feel that I can represent you at CAG's meetings. Please write to me at the School of Librarianship and Information Studies, Liverpool Polytechnic, 79 Tithebarn Street, Liverpool, L2 2ER or telephone 051-227 1781/3. (I sometimes teach, but a message can always be left and I will phone back.)

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ADDRESSES AND TELEPHONE NUMBERS OF ORGANISATIONS DESCRIBED

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LASER
33/34 Alfred Place
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WC1E 7DP (01-636 9537 (Director); 01-636 4684 (Interlending/Cataloguing)

SCOLCAP
National Library of Scotland
George IV Bridge
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SWALCAP
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National information policy

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Introduction

IN NOVEMBER 1981, the Joint Consultative Committee of Aslib, the Institute of Information Scientists, the Library Association, SCONUL, and the Society of Archivists, organized a Seminar at the Lane End Management Centre, the purpose of which was to clarify ideas about actions which the constituent bodies wished Government to take in the development of a national information policy.

Each of the organizations nominated five persons to participate in the Seminar, not as representatives of the nominating organizations, but as individuals having, between them, a wide variety of experience and viewpoints. Representatives of the Office of Arts and Libraries and of the Department of Industry were also invited to attend. In order to structure the discussion, seven speakers were asked to present background papers on key areas for discussion and a brief summary of these papers appears below.

The Seminar was chaired throughout by Mr. E. M. Broome, County Librarian of Hertfordshire. Mr Philip Sewell acted as rapporteur and subsequently provided a summary of the proceedings on which this account is based. Participants were conscious that they were conferring at a point in midstream of unusually rapid developments and had before them a number of recently published reports and statements relating to the topic under discussion. Among these were the report of the Advisory Council for Applied Research and Development[1]; the first Library Advisory Council report on the future development of libraries [2]; an advance copy of the main recommendations of the second report (which has since been published[3]); the Government's observations on the Fourth Report of the Education, Science and Arts Committee[4]; the Royal Society report on the Scientific Information System[5]; and the Green Paper on Copyright[6].

Prior to the Seminar most of the organizations had canvassed the views of their memberships and this information was also available to the delegates.

Summary of the papers

1. *Technical aspects of technological developments*

Speaker: A. E. Cawkell, Citech

Tony Cawkell described the various technological factors impinging on the information field and their effects. He emphasized the frequent differences which are found between the 'readiness potential' of various technical projects and the 'enabling infrastructure'. Technical feasibility alone is not enough: it must be supported by factors such as reliability, compatibility and social acceptance. He discussed requirements for standardization to facilitate access, up-grading and migration of information,

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nationally and internationally, and the Government's role in co-ordinating these requirements. He compared the market-driven information services structure in the USA with the largely government supported structures in Europe, with the UK holding a somewhat intermediate position.

2. *Applications of new technology*

Speaker: P. L. Holmes, B. H. Blackwell Ltd.

Phil Holmes came down firmly in favour of a mixed economy and reviewed the implications of some of the developments emerging from Cawkell's 'readiness potential' stage. He saw national information policy as a necessary corollary of government involvement and suggested that the library and information professions needed to decide fairly quickly on the kind of infrastructure they required, particularly as, in his view, a lot of the existing infrastructure was likely to disappear in the not too distant future. He also emphasized the need for compatible hardware and transportable software and for more basic research to produce new intellectual concepts which can make more effective use of the new technology.

3 *Political aspects*

Speaker: Miss A. Haygarth Jackson, ICI Pharmaceuticals Ltd.

Angela Haygarth Jackson suggested that the dichotomy in government responsibilities is highlighted by the definition of information technology which includes information handling (means) and information services (content). Considerable changes had already been made by the Government in response to recent reports and the second report from the Library and Information Services Council revealed a number of urgent problems which needed attention. She identified government's role as providing effective consultation machinery and initiating action in areas such as legislation, standardization, telecommunications facilities, research and development, pump-priming, encouraging the development of information systems for small industry, ensuring unimpeded access to public knowledge, education and training, and representation at the international level.

4 *Availability of and access to information: legal aspects*

Speaker: Miss G. Bull, University of Sheffield

Gillian Bull dealt cogently with the legal aspects of data protection, privacy, the right to know and copyright, and warned against pushing government into legislation which made only meaningless concessions. She pointed out that library and information personnel were often put into a position of having to police the enforcement of legislation relating to data protection and copyright whether they wished to or not and she was concerned about the barriers to access to information, and the creation of a 'two nation' problem of 'information haves' and 'information have-nots'. Legal measures may be needed to protect the latter in an information-based society.

5 *Availability of and access to information: resources*

Speaker: D. J. Foskett, University of London

Douglas Foskett considered the problem in the context of communications generally. He stressed that services supplying 'instant information' do not meet the need for discourse and that resources are needed for reference points conveniently located to ensure a full and balanced flow of information and advice. Co-ordination of existing resources requires some surrender of autonomy which can be accepted but if sectoral barriers are to be broken down, something more than voluntary action is required.

6 *Education, training and manpower*

Speaker: Professor W. Saunders, University of Sheffield

Wilf Saunders described the present situation in the UK in the field of education and training and the problems which had to be solved. He highlighted the difficulty of achieving change quickly in the somewhat conservative and bureaucratic higher education environment. There was a need for leadership in the education field and particularly for a focal point to give guidance, to attempt some measure of harmonization, and to conduct the continuous assessment of the manpower situation that was needed.

7 *Consultation machinery*

Speaker: Royston Brown, Cambridgeshire County Council

Royston Brown, who is also Chairman of the Working Party which produced the second LISC Report, described the consultation machinery now being set up. Since the establishment of this machinery is, perhaps, the most positive development which has so far emerged from the discussions on national information policy, his paper is given in full in this issue.

Results of the seminar

The last session of the Seminar was devoted to identifying the major points on which action was felt to be necessary, whether by government or by the JCC itself, or its constituent organizations. On the basis of the discussion at this session, the Joint Secretaries of the JCC prepared two sets of draft recommendations: one for possible action by government agencies, the other for action by the JCC. The recommendations are not at this stage in a form in which they can be presented to government without further ado: they are more in the nature of a blueprint for the kind of initiatives which the Seminar felt the Government should be taking within the context of a national information policy and form a basis for the establishment of priorities following further consideration by the JCC constituent bodies. A summary of the main recommendations is given below.

1 *Consultation*

Delegates were concerned that the machinery of consultation should be such as to give full recognition to the views of users and the JCC were asked to consider how this was to be achieved, preferably in co-operation with representatives of other interests, e.g. database producers and hosts, providers of computer hardware and software, and publishers.

Accepting, somewhat reluctantly, that the Government is unlikely to change its mind about rejecting the main recommendations of the Select Committee for a Minister of Cabinet rank for information policy, and that, therefore, decentralization of the information function within government is to continue, and provided that continuous consultation is established between the Office of Arts and Libraries and other government departments and that the Library and Information Services Council becomes truly representative of both providers and users, the consultation machinery described in Royston Brown's paper was accepted as reasonably adequate in present circumstances.

2 *Access to publicly available knowledge*

This is perhaps the key area in developing a national information policy and one where urgent action is needed. It was felt that the present arrangements for providing a network of information services at local, regional and national levels were unacceptable in that whole sectors of the population are deprived of an adequate standard of service and lead to waste, duplication of effort and frustration on the part of the user.

Suggestions for government action included the following:

(a) a survey of the distribution of existing services and the way in which they relate to the needs of the population;
(b) identification in greater detail of the kinds of information services which should be provided at the different access levels;
(c) development of a more rational method of funding services at different levels which relates more closely to the resources and responsibilities of local and central agencies;
(d) examination of ways in which advice and guidance can be incorporated into the services available.

As a first step the JCC and the constituent associations were asked to study and respond to the recommendations in the second LISC report and particularly:

(a) the implications of the suggestion that library and information services should move from a 'holdings' strategy to an 'access' strategy;
(b) issues relating to the creation of information 'haves' and information 'have-nots' arising from changes in the fiscal and technological environment;
(c) the relation between multi-level networks created for making information available and those which already exist or may be created for cultural, educational and recreational purposes.

3 *Legislation*

There was a consensus that the present legislation relating to data protection, copyright, library and information services, archives, and information transfer in general was badly in need of revision and that new legislation is needed to deal with issues which have arisen as a result of technological developments. Copyright and legal deposit were singled out particularly as requiring urgent action.

It was recommended that the Office of Arts and Libraries, in consultation with the JCC and the constituent organizations should undertake a comprehensive review of the legislation in this field, particularly:

(a) the extent of the area to be covered, e.g. data protection, privacy, copyright, legal deposit, statutory information collection (e.g. company records, trade marks, statistics, etc), and public and academic library services;
(b) the involvement of intermediaries as involuntary policing agents in the legal framework;
(c) the replacement of the present legislation relating to public libraries and museums by a Library and Information Services Act covering a wider area.

4 *Funding of new developments*

There was general support for the proposals in the LISC report that funding is needed for:

(a) the launching of new services which meet an identified need and which may expect to become self-supporting after an initial period (pump-priming),
(b) more continuous funding of services which are needed in the national interest but which are unlikely to be financially viable in the open market.

The JCC and its constituent bodies were asked to make specific proposals on developments for which funding is needed and to hold discussions with OAL and the Department of Industry to establish priorities.

5 *Research*

There is an urgent need for new intellectual concepts on which to base information storage and retrieval systems which can more effectively exploit the new technology.

It was recommended that approaches should be made to appropriate funding agencies, e.g. the British Library R & D Department, the Department of Industry, etc, to encourage them to provide greater funding for this kind of research in universities, schools of library and information science and other research units.

6 *Support for the information services industry*

There was support for the present Government initiatives towards promoting an awareness of information technology and its applications amongst the public at large, the main objective being to encourage and nurture the industries, e.g. the electronics industry, which are concerned with information technology products.

It was felt that insufficient attention was being given to the effect which the *use* of information technology and its applications will have on all other industries and activities; i.e. information technology as a functional capability which enables other activities to be carried out more effectively.

It was suggested that the information industry, by exploiting this capability, is in a position to contribute significantly to the economic growth of the nation, to achieve greater employment by fostering the development of well-designed and labour intensive services across the whole spectrum of national activity, and to contribute significantly to the UK export potential.

Among the many ways in which, it was felt, government could give support to the development of the industry, the following received particular emphasis:

(a) encouraging greater use of existing services by national and international agencies;
(b) developing legal and fiscal policies which are sympathetic to and likely to stimulate the development of the industry;
(c) initiating and supporting actions which remove barriers to the use of information services; such barriers include complex pricing policies, high telecommunications costs, restrictive practices in the installation and maintenance of equipment and systems, and unhelpful legislation.

7 *The telecommunications network*

An essential prerequisite for an effective national information transfer system is a cheap, reliable and efficient telecommunications network handling both voice and data traffic.

Industry in particular is urgently in need of an up-to-date, effective and affordable system which offers a uniform level of service and equity of pricing (i.e. uniform tariffs) throughout the country.

The JCC were asked to make urgent representation to the Department of Industry to take whatever steps are necesary, financial or otherwise, to achieve these objectives as rapidly as possible.

8 *Manpower requirements*

Profound concern was expressed that existing professional education structures are inadequate to provide the skilled manpower needed for the information age. Because of the wide range of skills which will be required the solution to this problem cannot be wholly within the competence of one profession and there is a role for government in bringing together the various agencies concerned and focussing their discussions in the right direction.

It was suggested that, in the first place, the JCC should do whatever it can to create an effective dialogue between the various schools of librarianship, information science and archives, and that attempts should be made to develop some consensus on the skills required and the kind of educational programme needed to produce them.

There was agreement that little progress is likely to be made in this area in the absence of effective machinery for making quantitative and qualitative assessments of the supply of and demand for manpower in this field and OAL was invited to take on the task of collecting and evaluating the data required for this purpose.

9 *Education of users*

The Government's initiative in providing microprocessors in secondary schools was welcomed in so far as it is aimed, principally, at familiarizing pupils with some of the possibilities of modern technology. However, fundamental to any effective use of the technology is an understanding of how information may be organized for use, what resources are already available, how they can be used effectively and how the results may be evaluated.

It was proposed that the Government should encourage, through whatever agencies are appropriate:

(a) the introduction in secondary schools, of programmes designed to impart information skills of this kind, conducted by suitably trained staff and backed up by adequate school library facilities.

(b) the provision by adult education organizations, of similar courses for adults who, because of the nature of their employment, would benefit from such training.

(c) an awareness of the value of such training among employers in industry and elsewhere and the establishment of machinery (c.f. the Industrial Training Boards) to promote awareness and use.

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Towards a national information policy

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Paper presented at the JCC National Information Policy Weekend Conference, November 1981

What kind of consultative machinery is needed and who should be involved?

ONE OF THE greatest challenges facing us today and for the foreseeable future is the management of change. Both the scale and speed of change which we are experiencing are in marked contrast to the comparatively stable and well ordered society which was taken for granted in the not too distant past. Even a casual survey of the current scene reveals fundamental political change, economic uncertainty, social unrest, changing patterns of employment, rapid technological development and other examples of a changing environment.

The information community is, of course, a part of this environment and is itself undergoing major change as a result of the factors already mentioned. In such circumstances, it is hardly surprising that certain behavioural characteristics emerge as a result of these pressures. One can see defensive postures, vested interests at work, fears over future direction being expressed, concern over uncontrolled market pressures, anxiety over professional and career prospects and other manifestations of our human nature. Indeed, I sometimes wonder if this is the driving force in the search for a national information policy. Are we instinctively groping for some kind of stability in this changing world? Would we really like the Government to pat us all on the head and say to librarians, information scientists and archivists, 'Don't worry, we really love you all and are going to guarantee you a safe place within the national structure'?

The fact is, of course, that we shall all face change in varying degrees and cannot expect to be immune from it. For some people at present working in traditional rôles within the information community, the nature of their jobs will change beyond recognition and their relative importance may decline, or even disappear. They clearly need to manage change sensibly over a realistic timescale, promoting a wider understanding of the problem, looking for new opportunities, re-training and re-deployment. Other members of the community will find their contribution enhanced, with increased demand for their skills and new doors opening as technology develops. Again, the change needs to be managed realistically to prepare, train and equip for these developments.

If we are to manage change sensibly as a whole, we must begin by creating a climate which makes that possible. This means opening up areas for debate, challenging

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existing assumptions, defining problems, involving the relevant sectors, promoting joint working rather than confrontation wherever possible, stimulating new thinking and innovation and experiment.

The key to all these activities lies in effective consultation. The Minister for the Arts published the first (Future Development of Libraries) report as a contribution to debate and I should like you to receive the new Library and Information Services Council report when it is published in the same spirit. The intention is to carry this awareness much further and promote some positive reaction to it. The title of the report is significant (Working Together within a National Framework). The phrase 'Information Community' covers a very wide range of professions and activities spread over the public and private sectors and encompassing types of provision ranging from a small rural branch library to the latest online terminal. Perceptions of the problems and possibilities also cover a wide spectrum.

Some of us heard the starter's gun a few years ago and have already covered a large amount of the track. Some are so far in advance they have almost disappeared over the horizon. Others have only just entered the race. Some of our colleagues are still in the dressing room, reluctantly tying on their running shoes and bemoaning their lack of training for the event. Still others are sitting at home by the fireside, thumbing through their photographs of previous races they have won and complaining that the community has forgotten what a good track record they have always had.

It is essential that as many people as possible within the information community are made aware of the changing environment and the need for the effective management of change if we are to avoid future direction being determined by default. The development of a national information policy is one of the instruments which can be used in this process and the purpose of consultation is to enable progress to be made in that direction. Previously, no national focus for this has existed and there has been no national forum where policy can be formulated.

What kind of machinery is needed?

Following publication of the 'Future Development of Libraries: The Organisational and Policy Framework' and the report of the House of Commons Select Committee on Education, Science and the Arts on 'Information Storage and Retrieval in the British Library Service', together with the Government's White Paper replying to the latter, an extensive round of discussions was held between the Office of Arts and Libraries and a wide range of organisations, including over 25 representative bodies. Two requirements clearly emerged from these discussions when considering proposals for the more effective planning of Library and Information Services:

1. the preservation of the independence of existing institutions and hence the need to make progress by agreement.
2. any framework for consultation should be of an *ad hoc*, informal nature and should not involve the establishment of a hierarchy of standing committees.

We need to recognise at the outset the real world in which we operate and concentrate on ways of getting things done within the known constraints, rather than producing neat and tidy theoretical structures which can never be superimposed.

Inherent in the proposals of the reports already published are three elements within the overall framework:

1. A Government Minister and his support staff as a focal point for information policy.
2. A national forum for the formulation of national policy.
3. The information community which needs to be brought more fully into the discussion of national policy and planning issues.

I propose to look briefly at these three elements, the new opportunities for consultation now opening up, and some of the implications for the information community.

The Minister and his department

It has been said on more than one occasion that the Government White Paper (Cmnd 8237) made the suggestion that the Minister for the Arts should have certain liaison functions in the field of information policy. That is not what the White Paper actually said. In a carefully worded sentence in paragraph 9, it said:

> '... to the extent that it may be necessary from time to time for an ***initiative to be taken on a matter not within a defined departmental interest***, the Government will look to the Minister for the Arts to raise the matter with those of his colleagues who appear to have an actual or potential interest in the matter so that appropriate action can be taken.'

In the course of a paper submitted by Aslib to the Joint Consultative Committee entitled 'The rôle of libraries in a National Information Policy', the contrast between the Government's response in the field of information technology and its response in the field of information policy is noted and the following reasons are advanced:

> '... whereas the concept "information technology" is comparatively easy to define since it is concerned mainly with electronic hardware and its applications, "information policy" is a much more difficult concept with many ramifications and diffuse limits. In the case of information technology, the groundwork had already been laid in the Department of Industry and the essential elements of the kind of action needed were well understood. On the other hand, ***information policy as an overall concept has never been the concern of any one Government Department***, although a number of Departments have been involved in one or other aspect of it.'

In this context, and echoing the White Paper response, taking the initiative on the question of a national information policy appears to be a prime example of the action the Government would expect from the Minister for the Arts. In his speech to the Library Association's national conference in September 1981, the Minister underlined his intentions in this respect. He is now effectively saying to the information community 'What exactly do you want me to do?'.

As far as his department is concerned, the following changes have recently been made or announced affecting the Office of Arts and Libraries:

1. John Gray, the former Director of the British Library's Research and Development Department, has been appointed as a special adviser to the Minister on information matters, bringing with him his responsibilities for information in the international field.
2. Responsibility for the Inter-departmental Co-ordinating Committee on Scientific and Technical Information (ICCSTI) has been transferred to the Office of Arts and Libraries.
3. New arrangements have been established to improve consultation between Government Departments.
4. The Minister has reinforced the Government's view that since Libraries and Information Services are a single area of concern, there should not be separate ministerial responsibility and separate advisory bodies and the OAL will reflect this approach in all aspects of its future work.
5. The OAL will, in future, engage more actively in promoting the acceptance and implementation of approved policies and practices by publication, discussion and participation in conferences and seminars.

A national forum

The Government White Paper did not accept the proposal for a new Standing Commission, deciding that it would not be appropriate to establish a new and separate body dealing only with information services. Its view was that the Library Advisory Council was capable of adaptation to provide comprehensive advice and the following changes have been made or announced:

1. The Council's title has been changed to 'Library and Information Services Council'.
2. Its membership has been strengthened and will be still further strengthened as new appointments are made to reflect its wider responsibilities.
3. Meetings have been held with the respective advisory bodies in Wales, Scotland and Northern Ireland to identify and pursue issues which need to be viewed in the United Kingdom context.
4. At its last meeting, the Council agreed to revise its policy on the confidentiality of Council papers in the interests of wider dissemination.
5. For the first time, a professional librarian and information specialist has been appointed as Chairman of the Council, Professor Wilfred Saunders.
6. At the last meeting of the Council, it accepted a paper from the new Chairman on improved working methods and I should like to quote some examples from the paper to illustrate the new approaches to consultation now developing:

   'In general terms, the objective is to enable a strengthened Council bearing wider responsibilities and having much closer links with the Library and Information Community, to offer advice to the Minister more promptly and over a wider range of topics than has been possible in the past. More specifically, Council will be trying to satisfy the following objectives:

   a. to keep the full span of potentially important issues under review
   b. to react quickly to urgent problems
   c. to enable outside organizations to contribute to its agenda and deliberations

In recommending means by which Council might set out to achieve the above objectives, the following assumptions are made:

a. that there will be a much closer working relationship between OAL and the Council and particularly between the Chairman and the Secretariat.
b. that the OAL will vigorously maintain continuing contact with appropriate national organizations, with individual Government Departments and with other elements within the organizational and policy framework.
c. that strong and positive efforts will be made to encourage organizations, individuals and, of course, council members to bring forward problems and issues of significance to Library and Information Services, preferably in the form of short papers or submissions to OAL.
d. that the means of achieving (b) and (c) above would include a continuing cycle of *ad hoc* meetings between OAL and appropriate organisations, supplemented by a regular meeting (perhaps annual) between the Council and representatives of the Library and Information Community at which policy and progress can be discussed and reviewed.
e. that in making up its working groups, the Council will be free to draw on specialist expertise from outside its own membership.
f. that the much more substantial disseminatory rôle envisaged for OAL assisted by the Council, is likely to result in a need for more frequent communication by publication and other means with the Library and Information Community than has been the case in the past.'

In addition, the paper outlined improvements to the working methods of the Council and suggested a means of systematic monitoring of topics that come within the Council's remit so that these may be reviewed periodically and none go by default.

The full impact of these and other measures in the pipeline will be to raise the level of expertise and output of the Council and its potential as a national forum and policy-formulating body. You may have reservations about this system and doubts about its chances of success, but I believe we must all try to make it work for two reasons:

1. it is the only system that we have and is being offered by the Government, and
2. we will not get another system until we have proved that this one will not work and have established the reasons for that failure.

I hope that we are not going to continue a dialogue of the deaf now that the Government has effectively called our bluff. For years, the Library and Information community has been hammering on the Government's door, complaining of the lack of a national planning forum and the absence of a Minister charged with responsibilities in this field. The Government's reply has hitherto been that they have not recognised that there is a problem and have challenged the information community to agree amongst itself and come forward with positive proposals. Now that the Government doors are swinging open and a wide range of consultation is being offered, are we so exhausted with the struggle that we are in danger of collapsing on the doorstep?

The information community

This third element in the national framework is a very large group, including both the institutions which provide information services, either to their own members or to the public at large, and the organisations which bring together and represent the interests of information specialists, providers and users. These are, for the most part, independent bodies, whether in the public or private sector which determine their own policies, but recognise that there may be advantages in working within an organisational and policy framework. How can they 'plug in' to the consultative machinery thus far outlined?

One way which was examined and rejected was for members of LISC to be representatives of organisations or particular interests. This would effectively mean a Council composed of members who would need to be mandated by their sponsoring bodies before agreeing in Council with all the ramifications this would have on speed and effectiveness of operation. Also, in many cases, Council members might not hold close working links with all sectors of such organisations. Expecting individual members to take their views into account might, therefore, be less satisfactory than direct official consultation with the organisations concerned. Members will, therefore continue to be appointed personally by the Minister, although he would welcome suggestions from relevant organisations of suitable names for consideration as members of the Council.

It seems to me that there are three dimensions to the consultative process which should have serious consideration by the information community. These may be described as horizontal, upwards and downwards.

1. *Horizontal*

The first task is to identify the common interest groups who need to be involved in consultation and the second task is to ensure that the members of these groups are talking to each other. The object would be to identify major areas of common interest, increase understanding, explore common ground and, where possible, work out agreed solutions. Examples of these common interest groups would include:

1. professional organizations such as the Library Association, Institute of Information Scientists, Society of Archivists.
2. employing organizations—those who actually pay the money to employ the professionals, including the Local Authority Associations, Government Departments, and, in the private sector, bodies such as the CBI.
3. educational institutions involved in the education and training of staff in the information community.
4. information technologists, including specialists in the hardware and software.
5. primary producers, such as authors, editors, database and databank compilers.
6. users of the various services.

There are obviously other categories and common interest groups who play a key rôle within the information community.

Some of these interest groups are not talking effectively to each other. For example, apart from ABLISS, which is essentially a meeting of the heads of library schools, there appears to be no effective machinery for co-ordination between the 17 schools of librarianship and information science—a critical area for the future in terms of managing change effectively. Other existing common interest groups may need to examine their constitution and perhaps re-form into more effective groupings based on genuine common interest areas. For example, the Joint Consultative Committee itself consists of professional organisations such as the LA, the IIS and the Society of Archivists, which clearly have common interests, plus organizations representing particular kinds of library and information service such as SCONUL and Aslib. Although I am not a member of the JCC, I would imagine that certain tensions emerge in their deliberations which could be traced to these different roots and standpoints. In addition, one of the dangers to be avoided in identifying common interest groups is for the spread to become so large that they attempt to become a mini-Library and Information Services Council and devote energy and time to reconciling views across a broad spectrum, rather than concentrating on the preparation of agreed position statements, covering more closely defined areas. The Library and Information Services Council's report 'Working Together within a National Framework' identifies the important rôle of the professional associations in bringing the various interest groups together.

2. *Upwards*

If the Office of Arts and Libraries takes the initiative in consulting, the identification of the key interest groups and the preparation of common ground is essential if the messages which go upwards to the OAL, LISC and the Minister are not to be confusing and contradictory. Is the information community organized to respond to requests for information, the preparation of reports, the analysis and proposal of options and the origination of messages upwards? Each representative body and organization needs to prepare for this in terms of basic administration, cycle of Committee Meetings, working groups and internal structures. The suggestion from the OAL of an annual meeting to review progress could be a useful check on these arrangements.

3. *Downwards*

This relates to consultation internally within the information community and the need for representative bodies and organizations to consult with their own grass roots membership. The dangers of not doing so are reflected in the caterpillar syndrome. The head of the caterpillar keeps raising itself up and constantly looking around for new directions in which to go, but unless it is successful in dragging its body after it, the whole insect never actually gets anywhere. How many of our members are aware of the dimension of the problems that we face, the pressures for change and the possibilities opening up? Can we rely on their active support and participation, or will we be faced with obstruction and defence mechanisms? What about consultation with the users of existing and proposed services? Many of them are even more confused than the staff involved at the rapid change in service delivery, formats and content. Although there are several levels of Government, there is only one level of the governed and it is the user at the bottom of the heap who eventually, in one form or another, pays for the services he gets. There are obvious dangers in coming forward with answers to questions that no-one is asking and setting up elaborate and highly efficient machinery which no-one will wish to use.

In summary, I hope I have made it clear that consultation is now possible and desirable. Although our methods need refining and developing, concentration must

LETTER TO THE EDITOR

INVENTORY OF SOFTWARE PACKAGES

We read with interest Mr. Rowat's paper on Microcomputers in Libraries and Information Departments (*Aslib Proceedings*, 34(1), January 1982, pp. 26–37). We commend Mr. Rowat's presentation of the state-of-the-art, but would like to correct one essential point concerning an 'easy way of discovering what is available'.

An inventory of software packages used in information work is now in progress and is due to be published in December 1982. UNESCO Division of the General Information Programme (PGI) has contracted COSTI (National Center of Scientific and Technological Information) to produce the inventory. More than 200 packages are already on file and inquiries are coming on daily.

Any software producer or vendor who has not yet registered is kindly invited to do so to the following address:

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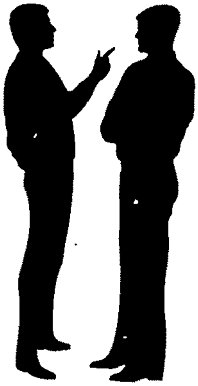

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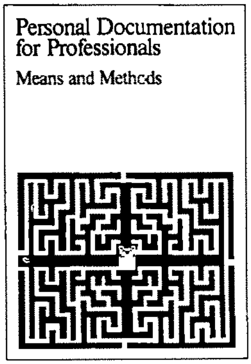

Personal Documentation for Professionals

Means and Methods

Personal Documentation for Professionals

Means and Methods

by **V. STIBIC**, *Philips, Ltd. Information Systems and Automation, Eindhoven, The Netherlands*

1980 2nd printing 1981
224 pages, 119 fig., 232 ref.
Price: US $35.00/Dfl. 80.00
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This useful and absorbing book contains 119 figures and 232 references, and is a **must** for every professional.

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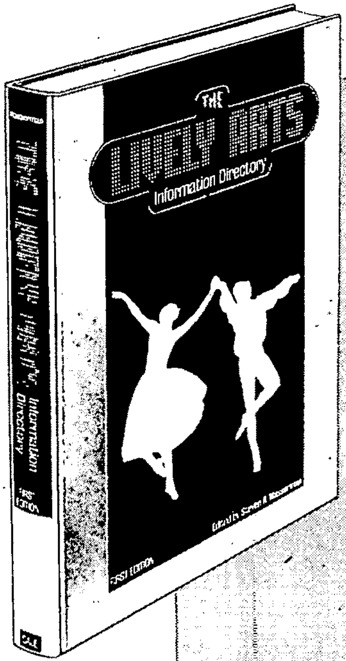

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Information economy, government and society

Pierre Vinken

Chairman, European Information Providers Association

Paper presented as the 15th Aslib Annual Lecture at the Royal Aeronautical Society, London, 9 June 1982

LET ME REPORT on a surprising personal occurrence which happened to me this morning. After coming out of the Terminal building at Heathrow, I was directed to an immense fleet of large black cars which obviously belonged to the Government car-pool. I was told to help myself. So I did and I then drove into Central London—a most pleasant trip. On arrival at the hotel, I was shown to the room which has been put at my disposal, with the manager's compliments, for the duration of my stay. The lunch I was offered was excellent and, surprisingly, that was on the house too. Then it was time to come here and I hailed a cab and was driven over to the Society building. When I tried to pay, the driver acted as though he had been mortally insulted. 'Oh no, guvnor', he said, 'this is a free country run by a centralized government.'

His surprise and indignation at being offered money were no less than the surprises I have had since arriving in this country. 'What is going on here?', I wondered. A few moments ago, another surprise. I was told that Her Majesty's Government feels that it is very much in the public interest for overseas visitors to deliver lectures and to do business here. Such people, according to Government thinking, are contributing to the general benefit of society. Naturally, as the Government wishes to stimulate such contacts and to make sure that the maximum possible is done for the comfort of these people, everything is provided 'free'. Just as many of you will have come here by means of the London public transport system now operating, as you know, on a complimentary basis.

Perhaps you do not believe such a tale—and you are quite right not to. It is an Orwellian scenario, a scenario that, a few years ago, some outside observers might have felt that the United Kingdom was edging towards. Such policies, where central government involvement creates an extensive new bureaucracy and which lead or have led to the virtual extinction of private enterprise in a number of sectors, do exist. It could still happen in the future in this country and it can be seen emerging in other European countries. It is the attitude of 'The Government knows best'—a policy which, if not regularly challenged, will become implicitly accepted by the public and as the bureaucracy gains strength, will be increasingly difficult to dislodge.

What I want to discuss in this presentation is the impact of such policies on the information field, on its economics and on the society being offered those information products and equipment. Before I can describe this, I must first establish the boundaries

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of what I see as the information field. I must define the current problems faced by various sectors and endeavour to show how these have arisen. Then, and only then, can I examine how the scenario embodied in the fable of my arrival will impact on the economic values placed on information and on society itself. Later, I will unfold another scenario, which is more dynamic, challenging and, in my view, more exciting. So, let us examine the components of the situation.

The technical catalysts

The two components which have brought about this increased awareness of information and its role in society are by now well known and well documented. They are, of course, the computer and the dramatic improvements in telecommunications. Between them, they have, from the mid-Fifties onwards, initiated the decline of the industrial epoch and the opening of the new information era: an era that has also been referred to as the information society or the information economy. The countries of the industrialized world began this transformation from economies based largely on industrial production and physical transport to those based primarily on information and the transport of information by communication. Just as the mastery of new energy sources, steam and electricity, created the infrastructure for the Industrial Revolution in the late 18th and early 19th centuries, so are today's catalysts, the computer and improved telecommunications, creating the required infrastructure for the new information society.

But just as the Industrial Revolution with its great impact on society generated social change and indeed social stress in the emergence of new industries, the decline of other industries (the so-called sunrise and sunset effect), new problems and new societal relationships, so is the new information age also reaping its share of problems, such as privacy for the individual and that of the extent of governmental control or involvement. According to one report, the complex of industries made up of telecommunications, computer and other electronic firms has developed to the point of being the third largest industrial area in the world.

This lecture is not the place to discuss the technical trends within the computer industry. All that need be said is that the trend is once again 'small is beautiful' and that costs are still falling. Forecasts indicate that the 60% share of the market currently held by the traditional large mainframe machines will fall to around 36% by 1985, while the market penetration of the microcomputers, minicomputers and small business machines will jump from 34% to 53% of the market. What this says for the information industry is that there should be an adequate number of devices capable of receiving information. I will touch on this again later.

The impact of telecommunications

Just as important as the computer or terminal device is the means of transmission of information in this new age. Transmission can be carried out either by cable or airwaves or both. Since the capacity of both cables and the electromagnetic spectrum of wave lengths is limited, each method of telecommunication is subject to scarcity and thus has a specific value. It is true that the spectrum cannot be used up (in the sense that fossil energy sources can) and it cannot be damaged or polluted (as can water or air), but it can be misused. In a badly arranged allocation of frequencies among users, interference can make the scarcity of the spectrum acutely felt. Thus, it is clear that telecommunication and the spectrum allocations are subject to the laws of supply and demand.

New methods have been introduced to try and ease this problem. Telecommunications, since the 1950's, have undergone a radical change, and this change has had a major influence on the development of information activities. Prior to the 1950's, telecommunications had been concentrated in a relatively small number of industrialized countries. There was little international traffic, the means for such traffic were few and the capacity limited. Now new transmission and switching techniques have resulted in a very marked increase in communication channels. The first communications satellite launched at the end of the 1950's heralded the beginning of a communications network embracing the entire globe. Since then, major fields of social activity—government, industry, transport, tourism, the military apparatus, education, the financial world, and commerce—have become totally dependent on such a network.

Today, in fact, the size and complexity of a country's telecommunications system has become the yardstick for its industrial and economic potential. For many years, the criteria used to be the amount of steel produced or the extent of its railway system. Now it is the density of its communications network or the amount of information transmitted. Telecommunications capacity is the most important feature of the information economy. It is this capacity that determines in large measure the society's wealth or poverty and it has become the most significant factor for change in a society.

This change is manifesting itself by such facts that in factories today fewer and fewer people are concerned with the transforming and transporting of materials, and more and more people are involved with inspecting, deciding, reporting and checking—in short, with the processing and transferring of information. In the developed countries, the current labour market reflects these changes: during the second half of the last century, the majority of workers were employed in agriculture. Later, during the first half of this century, the majority has been in industry. But now the majority are being employed in the information sector. Therefore, it is useful to define what we mean by the information sector and who is involved.

The information activities

It is difficult to arrive at a single satisfactory definition of the concept of information. In fact, I am not aware of any single one that could cover such diverse forms of information as an advertisement, a sonata, a novel, or a signal from outer space. Each separate context forces us to redefine the concept and we must simply learn to live with the consequential multiplicity. Moreover, it is difficult to see how we can define the word information without using in the very definition a variant of the word itself, such as message, data, knowledge, signal, representation, symbol, or pattern. So for the moment let us take what must be a simple and basic definition, albeit tautological too, that information is something that can be communicated.

In considering the economic aspects of information, we can divide information activities into two categories: producers and users. The former consists of the activities of organizations and businesses producing information, information equipment or services for sale. Examples are the electronic, publishing and printing industries and major portions of activities pursued by the government within the information market, such as postal services, telecommunications and education. These are obvious components of the producing sector of the industry. But consider organizations like banks. No longer are they in the Wells Fargo age where physical consignments of money were moved by stage coach, thus providing wonderful opportunities for bandits. Today, the whole operation is rather more sophisticated. The majority of the bank's work nowadays lies in moving information rather than money. You all know that to get some money after banking hours, you can, if you are lucky and the machine works, just insert your plastic card in the cash dispenser. But behind this transaction is an impressive flow of information. While on the subject, it is clear that all this sophistication has not prevented bandits from still robbing banks, only nowadays they too have to be more sophisticated—generally, today's bandits are good computer programmers gone bad.

So you will agree, I trust, that major segments of the financial world, such as banks and insurance companies, do also belong to the information producing sector. For the insurance company, the majority of its running costs are due to its research and actuarial work and the administrative machinery to support it. Another fact that confirms why such organizations must be considered as part of the information producing sector is that they own 20% of all major computers installed. Similar arguments can be advanced for parts of the public health sector, for advertising, brokerage and education. All can be considered as forming part of the information producing sector.

The information user sector on the other hand generates the information which those organizations and business need for their own use. In this sector, information is processed internally as auxiliary material for the manufacture of goods. They do not create information products for the market place. The cost of this information has to be absorbed, and it is absorbed, within the price of the product, under the heading of overheads, a portion of which relates to the information field covering the information used in research, administration and marketing. In short, information is the end-product in the producing sector and merely a means in the user sector.

Both sectors are, however, concerned and affected by a common infrastructure, by public attitudes to information, and by the degree of governmental involvement. As such then, the information sector as a whole forms a large and powerful group with important economic and social interests, but equally one which is faced with a number of external forces.

Just how big it is, is difficult to say. Some reports state that more than 50% of the total labour salaries are from work involving the collection of goods and services which could be called an information activity. While this is as may be, certainly the employment share of information related occupations is increasing, both because of the growth of employment in the service sector and also because of the substitution of information labour for non-information labour in manufacturing. In industrialized countries, the share of information occupations in the working population has increased by nearly 3% in each five-year period since World War Two.

In another study, based on 1967 figures, information activities in the United States were reported even then as accounting in total for almost 50% of its GNP. And half of this was generated by the information producing sector, which the report stated was expanding substantially faster than the GNP itself. However, such figures must be treated with caution. Not everyone will agree with the premises on which the studies are based or the conclusions derived. So these statements should be taken more as guidelines or indications of direction rather than definitive ratios.

Information and economic theory

Economic theory states, that, given a free market, the laws of supply and demand will set the price levels of a product or a resource. Information is a resource in much the same way as food and energy are resources. But, unfortunately, there is confusion and muddled thinking when it comes to applying economic principles to information. A school of thought exists that says there are striking differences between this commodity and what they claim are the more conventional products. My view is precisely the opposite, namely that the exact same laws of supply and demand *do* apply. Let us examine these two approaches in more detail.

The 'non-economic' school of thought says that information is not scarce. On the contrary, it is claimed to be available in abundance. It is also claimed that it does not disappear or deteriorate. Information cannot be consumed, so they say. In fact, because the consumption or use of information generates in its turn new information, it is alleged that usage increases its value. Of all the processes, it is only information that does not obey the inflexible economic lawhat information is of great value. Agreed, information continues in that everyone can get as much information as he wants and the more it is needed, the easier it is to obtain. Thus the problem with this commodity, it would seem from these arguments, is not so much how we must master and optimize its scarcity value, but how we must cope with its abundance.

If all of this were true, one certainly would not regard information as an economic resource or the communication methods for its transmission as subject to economic laws. Economics are based on the principle that every resource people want has a scarcity value and this, in turn, determines its economic value. If, as the non-economic school suggests, information were available in abundance, it would have no value and thus would *not* be an economic resource in the accepted sense of the word.

Looking at the counter argument, the reverse is true. This approach to which I subscribe, states that there is no doubt that information as a resource obeys the fundamental economic laws and that information is of great value. Agreed, information does exist in abundance, but that is not what gives it its value. Its value is determined by such factors as its structure and depth, or to put it another way, by its *relevance*.

Taking the first of these, imagine entering a library where the collection is in random order and for which no catalogue exists. Certainly, there is abundance of information, but no structure and hence the collection for the user would be virtually valueless. The collection only becomes of value if large sums of money are spent in cataloguing it, i.e. producing, processing, storing, transporting and arranging the information. This requires equipment and plant and provides work for many people. Without this investment, communication of information would be impossible. Thus, information is only useful if it is structured. As an analogy, we have water in superabundance in the world, but it can only be consumed if it has been purified or enriched. Direct application of information necessitates a special structure, and achieving this costs money. Thus there is, in reality, a scarcity of structured information, that is information ready for immediate use for every specific purpose.

Information is indeed being continually consumed or changed. It is, in fact, subject to wear and tear and needs constant improvement or recycling. The more we learn, the more we require new, more detailed, information, in order to carry our activities a step further. Information becomes obsolete with the passage of time. It does not disappear, but it becomes less and less relevant. Ultimately, it fossilizes, at which stage it has ceased to be an active ingredient in the information recycling process. The knowledge necessary for the building of a boiler for a steam-engine is insufficient when it comes to constructing a container vessel for a nuclear power reactor. Information generates knowledge and knowledge generates information at a higher level. As a result, the previous information is superseded by new information of greater depth. The added value has created an improved product.

This continual recycling process can take place in a number of ways, since information can be a raw material, an auxiliary material, a semi-manufacturing product or an end-product. For example, a novel or film is an end-product, but at the same time to the critic it is the raw material. Music is an information end-product but it can be used as a semi-manufacturing component in a film. As an auxiliary material the editing of an author's manuscript by publishers for the construction of an end-product is one example of such an application. All these points will, I trust, have convinced you of the validity of the view that information is a commodity like any other and that it has to conform to the laws of economics.

But why is it necessary to convince you of this connexion between information and economics? One reason, I believe, is that there has been little study of information within an economic science framework. This is partly due to the fact that we are not used to applying economic terms or theories to abstract, intangible products. Information is transitory in nature, sometimes even volatile. Unlike other commodities, it exists in numerous forms and in varying degrees of correctness, detail, timeliness, specific content, universality, durability, and quality. It is heterogeneous in nature: it is difficult to divide information into clearly separate units of equal or comparable value. How can one say that a book for which one paid £8.50 is or is not worth it because it happens to contain 16 ideas which you only rate as worth 20 pence a time. This problem of products containing multiple items which cannot be separated out is in some way analogous with transport. The price of a railway ticket is not counted by the number of stations through which you pass, but on the length, comfort and speed of the whole journey.

However, in my view, these form only part of the reason for the non-application of usual economics. The main reason lies in the deep-seated resistance in our political thinking to the application of normal principles of integral costing to resources such as information and knowledge.

The effect of culture on information

A year ago, in his Aslib lecture, Mr Edward Ploman dealt critically with the proposition that information and communications are economic commodities. He found this market-oriented attitude, captured in the phrase 'the market-place of ideas', both denigrating and demeaning. He observed that with such a proposition, the social, political or cultural dimensions of information are conspicuous by their absence. This is a view with which I must disagree. Surely no-one can fail to see the social, cultural and political aspects of information. In all probability, they are more evident than with any other product.

Of course, information (perhaps *all* information) has social, political and cultural connotations. Of course, to take but one example, our entire educational system is a cultural and social structure of the first order and what is it but an immense information system? But having said this, it does not follow that it is immune from the normal laws of economics. Do not teachers have to receive a salary and do not parents exercise value judgements where they can between private and state schools? Have we reached the point that schools and laboratories can be built and maintained without cost? Do members of an orchestra perform for nothing? Even extending the argument to the religious field, again another area involving the transfer of ideas and ideals, even the gentlemen of the cloth have to eat and the services they provide have to be paid for.

Neither the price nor the related costs of information have much to do with its eventual social, cultural or political impact. Such value, often enough, is only realized and appreciated much later. This has frequently been the case with works of art. Take, for example, the inexpensive Japanese prints so widely and inexpensively available in Europe during the second half of the 19th century. Consider the major influence they had on European art then and later. And yet it is clear that the great economic value of this art-form only became established decades later. But throughout its life the law of supply and demand was valid here too.

Turning to more domestic matters, has information and its value permeated through to the domestic consumer? Judging from the results of the Prestel marketing to the home, the answer must be a resounding 'No'. Even such august studies as those by the OECD, which have kept track of household expenditure, show that there is little evidence that information goods and services are accounting for an increasingly large proportion of domestic expenditure. However, the modest growth in final demand for information is, to a certain extent, masking the real nature of development. While the domestic user may not be spending much more on information, he is certainly getting far more. As the number of TV channels increases, more and more information is being made available, whether it be on horse racing form, changes in football teams, courses on cookery or merely those palliatives—the old TV-movie. Sociologists could well argue that even the latter pass some information and cite in consequence the current vogue for fashions from the pre-war era!

So, one could argue that the law of supply and demand is operating here, where, within a competitive field, more information is being made available, more choice is made available and the cost of receiving this information has remained roughly the same. Equally there is an indirect effect where the domestic user is receiving more information, but this is built into the appliances he is now using. Look at the 23-program choice on today's washing machine. The information content built in into today's goods has gone up considerably. Information technologies are resulting in important product changes. Such products are becoming widely used at work and in the home, and an increasing portion of their price reflects the information being worked into them.

Information technology

Earlier I touched on two of the building blocks of the information society, computers and telecommunications. Another major element is the method of handling information itself, i.e. information technology. Virtually all the new developments in the field of information technology have originated in the United States. Europe and the rest of the world have a lot of ground to make up. While this is generally acknowledged as far as the computer industry is concerned, it is also true that international data generation and communication is primarily in American hands. Of course, since the 1970's, a large number of databases have been created in Europe. But this is not as impressive as it might sound. The majority are limited in size and inaccessible online. The fact that there are no major European online systems is due less to the Europeans' lack of initiative than to the hopelessly uncompetitive nature of the European online market. Potential online systems in Europe are required not only to compete with the large American systems but also with the 20 or 30 European home-grown systems that seem all too frequently to be the subsidized, pampered and favoured off-spring of practically every national government that exists.

There used to be a saying that every emerging country had to have its own airline and steel works. Now the saying goes, at least in Europe, that every country has to have its own online system regardless of the economic viability of it. When one looks at the market place, the potential viability for these multiple services looks bleak. More than half the European online market is in the hands of three American companies; European exports in this field are negligible. In no other field is the European trade balance so poor. The further outlook is far from promising. The information industry in Europe is a good deal less homogeneous than its American counterpart because of the diversity of countries involved and the market for information is fragmented because of the multiplicity of languages.

An important factor in, but at the same time a condition for, further economic development of information services is the number of installed interactive communication terminals. Before the end of the decade, terminals will be as common in business, industry and private homes as the telephone is today. In the United States it is anticipated that, within the next 10 years, there will be one terminal for each four members of the labour force. Some forecasts suggest that the Americans may have 10 million terminals by 1989. Naturally, this kind of growth can only take place if the necessary data communication capacity is available. Given the track record of the European common carriers in this particular field, it is to be feared that the European information economies will continue to remain where they are now—lagging well behind that of the Americans.

Developing countries

Much is talked about the developing countries and their need for information to help them achieve the required uplift in their status. Major programmes of information assistance are being operated by the United Nations Development Program and the United Nations Industrial Development Organisation, but the fact remains that the relationship between developed and developing countries in the information economy is no different to any other comparison of an economic nature in other subject areas. In fact, as far as information is concerned, the difference is, if anything, more disadvantageous to the developing countries as the following figures will show.

Total world consumption of paper used for carrying information amounts to some 60 million metric tonnes per year. The printing industries of the industrialized world currently process more than 85% of the 'cultural' paper consumption. The non-industrialized countries, with 73% of the world's population, process less than 15%. These figures are influenced naturally by the high illiteracy rate in the developing countries. It is estimated that about half the population of the developing countries aged 14 years or older is unable to read and write. Nevertheless due to the vast populations living in these areas, the numbers of those who are able to read and write means that there are more literate adults living in the developing countries than in all the industrialized nations put together. Thus about 56% of the world's literate adults have a share of less than 15% in the world's cultural paper consumption.

The situation becomes no different when one looks at the communications capability. It has often been said that the developing countries can leapfrog the paper stage and go straight to use database systems. But when one sees that less than one-third of humanity possesses three-quarters of the world's telephones this is clearly not a feasible argument. Particularly when one adds to this the fact that 90% of the world's electromagnetic spectrum is in the hands of 10% of the world's population.

The old Law of Pareto, on the unequal distribution of wealth, or the new Matthew Effect, on the unequal distribution of information, be it for an individual or a nation, is valid here too. This means that the richer the country is, the more communications it has and the easier it is for these to be extended. Each new unit, telephone connexion, wave length, cable network or satellite added to the existing apparatus increases the country's capacity by more than a straight proportional amount. In fact, it would appear that in the information field, as in other walks of life, those already with riches get richer, and those without have to struggle.

Summing up so far, there are at least four major points I hope that I have impressed on you. These are occurring independently of any government action or not. They are due to the natural laws by which commercial life operates and by which our society exists. They are:

1. Information can and should be treated as an economic commodity obeying the laws of supply and demand. The factors that make it act this way in an unfettered and unregulated market are not the so-called abundance or over-proliferation, but the scarcity of properly structured information and the work that has to be invested in information thus giving it its value.
2. Culture has an effect on information and, indeed, information has an effect on culture. Changes in culture, changes in fashion, changes in application areas cause fluctuations in the value of items of information. Likewise, the wider spread or availability of information is having an indirect impact in the home as more information is now available.
3. The effect of the information on the developing countries is likely to be more acute than the usual North-South situation.
4. The United States occupies a dominant position in information technology.

Now is the moment to move on and view the effects of government and regulation on information and the use that society makes of information. The first three of these four factors I have just indicated are independent of governmental action. The fourth—the position of the U.S.—could be said to be due to benign governmental interaction, where the underlying principle of U.S. policy in the information field was the role of private enterprise as the source of economic strength. Money was invested by the National Science Foundation and by the defence authorities to build databases and to provide development of prototype online retrieval services. Lockheed and SDC are examples of this benign government start-up assistance. But government action can be benign or malignant. In its malignant form, it results in the Orwellian effect, as described in my introductory fable which could be subtitled 'How to stifle growth and initiative'.

The Orwellian effect

The natural growth of an industrial sector can be seriously affected by the existence of a monopoly or of restrictive government regulations in that market. State regulation has the effect of increasing the risks associated with innovation and this, in turn, has a discouraging effect on the tempo of innovation. The prospects for innovative endeavour vary widely from company to company. Some may have the technical capacity lacking in others. Some may have larger financial resources. Some may be willing to assume greater risks. Some may be better placed to succeed, simply because they have other prospects which have covered much of the required ground and because, given their particular lines, their need is greater. Some might succeed because of a fortuitous spin-off from their regular research and development work. The greater the number of companies competing, the greater the possibility of successful innovation. However, a potentially significant number of participants will be eliminated as the result of their being unwilling to conform to over-regulation, with inevitable consequences for the level and volume of innovation.

In addition, regulation places a premium on size. With regulations imposed, a minimum size may be needed to respond effectively to requirements concerning the often arbitrarily imposed standards, maintenance of records or the preparation of reports. Whenever regulation is imposed on, or applied to, an industrial sector made up of small-sized firms, the resultant tendency has been towards the creation of a limited number of larger firms. For those companies willing or having to comply with monopoly regulations, the prospects of delay or rejection of innovation are serious realities. Delay is a common phenomenon associated with government-controlled bodies, and it is particularly detrimental since it is closely linked to such problems as market acceptance and obsolescence. Consider the formidable long-term cost of the retarded development in Europe of satellite communications, of data communication, and of computerized switching technology. The truth of the situation is that the public sector cannot react to the market place at the rate required.

But these are merely general observations. Let me now apply them to actual areas of information activity. I have selected four examples: (1) scientific publishing and the problem of document delivery, (2) the blockage imposed on publishers to entering commercial broadcasting, (3) the impact of information transfer by telecommunications monopolies, and (4) data storage and retrieval.

Scientific publishing and the problem of document delivery

To explain the factors of this situation, it is necessary to fill in some of the background to show why and how the present crisis in this area of publishing has occurred.

In the course of this century, the scientific journal has become a specialist reference tool, published in instalments and carrying research reports. There is now such an overwhelming number of articles published that it has become impossible for the scientist to keep up with every development in his field. In fact, there are now so many journals per specialty that he finds it impossible even to thumb through them. Therefore, he restricts his reading to those subjects on which he is currently working, while further information he might need is specifically retrieved from a wide variety of journals, most of which he never actually sees.

Approximately one million such articles are published each year throughout the world. The cost of writing them amounts to about £1,000–£1,500 million. The publishers' editorial costs account for at least another £1,000 million. The costs involved in the production and dissemination of scientific journals amount to something of the order of £2,000 million a year. The annual cost of subsequently abstracting and indexing those publications eventually being stored in databases amounts to something to the order of £50 million. On the consumer side of the equation, we have the average scientist, engineer and business manager spending almost a quarter of his working-day in reading. Consider the figure we would get if this was costed out!

Nowadays, scientific journals are to be found almost exclusively in libraries; personal subscribers form a decreasing minority. As a publisher, I know that this trend has resulted in bringing about a gradual reduction in paid subscription, thus obliging us to increase prices. As librarians, you have had to respond to these price increases by cancelling double subscriptions and seeking to take out joint subscriptions with libraries in your area. We all know that this vicious spiral dates from the 1960's, and I personally am sure that, in the long run, a large number of journals will simply disappear.

This disastrous spiral movement could not have started without another factor, namely the copying machine. In the old days, journals had to be available in all places where research work was being carried on, but the advent of the copying machine made this unnecessary. The copying machine has done away with the need to read articles in a library or wait for days to borrow the journal, or to even order a copy from the publisher. It has also done away with the necessity of having to transcribe articles, in whole or in part. An even more dramatic change came about when libraries started providing a new service—called document delivery—on a large scale. It is now possible to obtain within days a photocopy of any publication you want, at a price appreciably *less* than its cost. If this spiral movement were to be extrapolated *ad absurdum*, the end-result would be the publication simply of a single copy of each journal issue. This would be made available to a central library at a subscription price which would be truly astronomic.

As a result of the copying machine, the growth in the market for scientific and educational publications has been seriously impeded. In the world as a whole, some 400,000 million photocopies are made each year. If we can assume that 95% of these are made from non-copyright material and the remaining 5% taken from copyright material, then some 20,000 million pages of information are used without due remuneration to the authors and publishers involved. This figure represents a market of £700 million. In the European Community alone, some 80 million pages of copyright material from scientific journals will be copied this year. For the whole world, this figure is likely to be close to 300 million, representing a market of about £40 million. The publishers' market for special articles for class-room and extra-mural educational use has virtually collapsed. It has become quite normal practice for a school to purchase a single copy of a book or periodical for its master-file and then for this to be photocopied in bulk for use by its pupils. The wholescale extraction of data from copyright material and its subsequent use in databanks without the slightest regard to the author's and publisher's costs has become a routine affair. This surely can be compared with travelling on a train without buying a ticket or sneaking into a cinema through the rear entrance. Whatever else lawyers may call it, I would call it stealing. This kind of stealing has become widely practised and accepted due to the absence of appropriate copyright legislation.

Thus we have a situation where government *inactivity* in generating suitable copyright legislation is causing loss of revenue to the publisher, a loss that is compounded by the *activity* of the government in applying very considerable public funds through which libraries can perform the document delivery service. All of this is being done with a short-sighted view of society's long-term economic interests. In time, this pirating of the other man's information will cause a fundamental disruption in the existing system of scientific and educational communication.

Broadcasting

The damage done to scientific journals by governments finds a parallel in the damage caused to newspapers and magazines by the refusal of European governments to allow their publishers to participate in radio and television advertising. In most western European countries, broadcasting is either a state monopoly or it is so strictly regulated that it certainly cannot be regarded as an unfettered commercial activity.

Indeed, most European broadcasting systems carry advertising, but their revenue ends up in the public sector. Accordingly, there has been a slow but definite shift in the market share of advertising to the detriment of the private sector. Since virtually all newspapers and periodicals depend on advertising to a greater or lesser extent, such a state of affairs is eroding their existence, and thus, ultimately, jeopardizing the pluriformity of the general information systems of our society.

Faced with the same erosion of newspaper revenue in the United States a different end-result has occurred. When consumers changed from reading to viewing, such major weeklies as *Colliers, Saturday Evening Post, Look,* and *Life* went out of business. In the States this trend led to a series of mergers between publishers and broadcasters. Two beneficial effects have resulted from these mergers. In the first place, the traditional publisher has been able to keep pace with, and adapt to, the technical developments taking place in the information sector. Secondly, competition in, and variety of, information provision have remained intact within the private sector. The situation in Europe is quite different; the natural development of the private sector is being either impeded or stifled by government rules and regulations.

Broadcasting freedom can be discounted to the non-democratic countries of the world. These countries have a state-controlled system. In democratic Europe, with the new technology now creating a wealth of transmission channels, it is intolerable that governments should continue to control their allocation or even the use to which they are put.

Many politicians seem to be indulging in double-think when, on the one hand, they vigorously oppose the commercial exploitation of television and radio broadcasting, and on the other hand, continually voice their concern for the maintenance of a free and pluralistic press. They seem not to recognize that no newspaper today can possibly exist without carrying substantial advertising. And, of course, they regard the press, and rightly so, as a cornerstone of Western democracy. Why is it then, that a more pluralistic broadcasting system, similarly based on advertising, is regarded with suspicion and even with hostility?

The sometimes heated discussions that take place on this subject tend to focus exclusively on the question of public versus private broadcasting. Too little attention is paid to the possibility of creating a dual system, in which the state does what should best be done by the public sector, but does not put any obstacles in the way of normal development of the private sector. By what right should a democratic government decide what information shall be broadcast to its citizens? Both the European Convention on Human Rights of 1950 and the International Covenant on Civil and Political Rights of 1966 grant to the individual the basic human right to receive and impart information of any kind and through whatever media, including broadcasting, without government interference and irrespective of national boundaries. And although the European Convention specifically and the International Covenant by implication allow governments to submit broadcasting to a system of licences and to impose other restrictions, such licensing requirements and restrictions may not limit the scope and intention of this basic human right. In point of fact, however, this is exactly what our governments are doing. It appears that the hard-won freedoms enjoyed by printed material are coming under attack once the same material becomes available in non-print form. So here one can see a direct blocking effect on our society's information system.

In any industry, a company will refresh its product range once its existing products have reached maximum market penetration. This refreshment is done either by introducing new products or by entering new areas. To the publisher faced with the stagnation in the existing field of publishing, it would be a natural move to turn, as publishers have in the States, to other forms of communication. A prime candidate is broadcasting. But in Europe, the Orwellian effect of regulation and control prevents this. Clearly, a case of too much governmental involvement and much of it due to confused political thinking on the nature of broadcasting.

The telecommunications monopoly

Turning to my third example, the less than benign influence of the state on the broadcasting sector is even more evident in the field of telecommunications. In most countries, telecommunications are controlled by a single body, a state-regulated monopoly. Frequently, the telecommunications body is incorporated with the national postal authority, the carrier of information in hard copy, thereby creating one grand information-carrying monopoly. It has been argued that there are good reasons why these particular functions should be the preserve of an authority enjoying monopoly powers. Such a single authority supposedly can best:

—control the limited number of wave lengths and cables,
—establish standards and conventions,
—negotiate international treaties,
—obviate capital wastage by avoiding duplication of research and development facilities,
—pass on benefits from economies of scale,
—stimulate the tempo of innovation,
—make itself answerable to government,
—allow revenue from some services to be used to subsidize others,
—keep down local rates,
—guarantee the security and reliability of the whole system,

and all of this, as the saying goes, in the public interest.

It is true that, lying at the root of the creation of the state monopolies, there were important considerations of a financial and socio-political nature. Initially there was a call for standardization and there was the need to provide a nationwide telephone network operating within a uniform price structure. There was the necessity to achieve optimal distribution of the limited number of communication frequencies. And, of course, there was the very obvious consideration that a monopoly of this kind could generate a considerable amount of revenue for the state. At the time, these may perhaps have been laudable enough goals, but a lot of water has flowed under that proverbial bridge since then. Scarcity of telecommunications capacity no longer exists. But monopolies are continuing to make a lot of money for the national coffers.

I would now like to demolish these so called advantages of the monopoly.

First, it is not necessary for consultation to take place between state monopolies in order to achieve the desired standardization. Numerous examples can be adduced of rapid and effective international standardization conventions between commercial companies where the state itself has played a subordinate role and the state monopolists none at all. The natural standardization process intensifies itself more than proportionally to the natural progress of technology. To the monopolist, standardization has gradually become an end in itself, the remedy is worse than the disease. Products not conforming to their, often arbitrary, standards are not developed and investments are not made.

Secondly, capital wastage can be avoided, it is true, by monopolies or semi-monopolies, either state or private. The question may well be asked, however, whether this is really in the interest of the economy as a whole. Competition leads to larger overall investment, which, in turn, results in more employment. That these investments should overlap or duplicate each other is not necessarily a disadvantage for the economy.

Thirdly, the assumption that the telecommunications industry is characterized by large economies of scale and is therefore a natural monopoly is simply incorrect. Economies of scale for the telephone system are not particularly large and satellite communications are characterized by few, if any, scale of economies. And none exist in the manufacture or distribution of user equipment. Besides, the industry itself is characterized by substantial growth that tends to make room for new operatives.

Fourthly, the present European system results inevitably in an ever-increasing and complex bureaucracy with a poor public accountability. A monopoly's indirect costs are high, a fact which can be ascribed to a reduced incentive to allocate resources in an efficient and optimal manner and to the failure to maintain a firm cost discipline. The costs involved in maintaining a monopoly are likely to remain substantial in comparison to its proclaimed benefits and certainly to their likely costs in a competitive environment. The monopoly carrier's tariff structure is extremely complicated and full of anomalies. Since tariffs and usage do not tally consistently, the current structure can only provide imperfect signals about investment needs. Even if, say, the PTT monopolist was aware of the market's investment opportunities, he does not necessarily have the funds to meet them; since his profits have to flow into the state coffers.

Fifthly, it is true that, in the past, some of the common carriers assured the consumer of integrity and quality of the system. But quality of telecommunications is no longer a homogeneous entity. Some users prefer noisy lines at price discounts, others demand conditioned lines at premium prices. Some subscribers prefer transmission rates of 9600 bits per second, others prefer 56 kilobits per second, or 1.2 megabits per second. Some prefer analogue technology, others want digital. Some are satisfied with circuit switching technology, others prefer packet switching. The point is that the user today is confronted with an array of choices in telephone quality, data speeds and bit rates, depending on particular uses, needs and requirements, and these represent unprecedented market opportunities. For a monopoly to offer choice is surely a contradiction in terms. We are seeing the situation emerge where the user is now more knowledgeable about his needs than the supplier; the ideal situation to be exploited by private sector action.

In seeking to justify or defend their privileged position, the monopolies sometimes advance the argument that their actual activities are restricted to the purely technical transport of information. What they conveniently forget to add, however, is that they happen to determine the extent and timing of investment in their technical apparatus and thus the capacity, configuration and the price of the communication network. If there is shortage of capacity, the monopolist has to make a selection as to who gets priority. In the final analysis, it is the monopoly and not the user which is determining what information is available and at what price. Besides, the monopolies' technical restrictions on interconnect equipment limit the user's ability to acquire the equipment best suited to his needs. These limitations influence the content that can be passed through the conduit. In communication, it is impossible to completely separate the medium from the message. The quantity of information affects its quality, in much the same way as make-up and lay-out of a newspaper affect the form or even the nature of the information reaching the reader.

The merging of telephone with postal services is generally regarded to have slowed down the technological progress in the former field in most western European countries. Today, the PTT monopolies are hindering any real evaluation of the problems involved. The fact that the telecommunications network system in Europe is a number of years behind that of the Americans cannot be ascribed to Europe's inefficiency, timidity or lack of expertise, but rather to the fact that state monopolies have prevented any direct participation by European industry. Users and producers of equipment can exercise very little pressure on the common carriers. All too often, decisions are taken only in the short term, by an inscrutable and diffuse apparatus, which, in a sense, has both legislative and executive powers. A hundred years of cooperation between the various European telecommunication administrations enabled them to link up their separate telephone networks. Thus far we have no harmonized network for the new telematic services in Europe. Indeed, had it not been for the European Commission's Euronet initiative (and that only in embryo), Europeans today would still be waiting for the kind of continental database network that the Americans have been enjoying for the last 10 years.

Storage and retrieval approaches

My fourth example is of more immediate impact on individual users. Just as governmental regulations impinge on telecommunications, so can they on the more mundane matters of actually obtaining information from a database. This is especially so when the storage and retrieval systems, such as viewdata, are currently being exploited by a number of national carriers. The configuration of a database system, its particular combination of hard- and software, can make it more suitable for information structured in one way rather than in another. A search done by means of a tree structure, a subject index or by scanning a free text provides you with differing results.

A noteworthy example of this effect is that of two of the oldest and largest bibliographic databases. Since the end of the 1960's, the two largest biomedical databases, Excerpta Medica and Medlars, have processed and stored records of articles contained in essentially similar journal lists. In the last 20 years, there has been a considerable number of comparative studies on these two databases. It appears that the different structure of each causes the retrieval of very different bibliographic lists in response to the same question. Choice of a particular retrieval system very much determines the nature of the information eventually retrieved. Inherent in the architecture of a particular database configuration is the selection of a certain structure of information which the system is going to carry and will be at the ultimate disposal of the user. There is, in principle, no such thing as freedom of expression on state-controlled videotex.

To summarize then the effects as exemplified by the four examples, the paradox is that our governments are doing too much and too little. They are insufficiently active in regard to copyright legislation and far too active in regulating the electronic media. The paradox stems from a supine reaction to the new information technology: the development of copying techniques and the rapid progress of telecommunications. Governments will have to involve industry over a broad front. Encouraging a developing industry means more than resorting to exhortations and tax concessions: it means giving it contracts for goods and services needed by government rather than having the work done by government bodies. Government is needed as an example, as a source of raw information, and as the encourager of the private sector. It is not needed as a self interested industrial enterprise, an inefficient subsidized competitor, or as a cumbersome service supplier.

In my view, there are few, if any, arguments in favour of monopoly. Most, if not all, of the arguments in favour of monopoly and government regulations have been overstated; as have the cost or difficulties which would allegedly result from the introduction of more competition. Such difficulties are unlikely to arise.

More importantly, a fundamental change of thinking is required. Such a change should be comparable with the philosophy behind the Freedom of Information legislation. In this, all information is available unless specifically classified. The attitude should be such that those challenging the status quo should not be required to disprove the rationales adduced in justifying or defending existing monopolies or regulations. The shoe should be on the other foot. In a free market economy, competition is the norm and state regulation should be the exception. Not only should the latter be applied sparingly, but such application should continually have to be shown to be really necessary.

A futuristic dream?

I started this lecture by describing the supposed sequence of events following my arrival at Heathrow this morning. Let me lead you round that once again. I took an early plane, having driven to the airport direct from my home. In the arrivals hall at Heathrow, I saw a wide range of telephone and other communication equipment, all in different colours and each offering a different and exciting reason why I should use them. In the end, I chose a phone-like box which gave the possibility to make one long distance call free of charge. It was hyper modern, streamlined to perfection. To start with I inserted my universal magnetic identification and credit card in the slot. I double checked my hotel reservation. The screen confirmed that this was O.K. After this, I telephoned my office in Amsterdam. My secretary was not at her desk, but her text processing machine was automatically activated and the screen gave me a listing of the various phone calls and letters received this morning. I saw that a business friend had called me from London. He wanted to have lunch with me tomorrow. So I then had to change my return flight and to extend my hotel booking. Just a few buttons to press and the job was done. And since for most of tomorrow I would still be in London, I decided to go the whole hog and take in a theatre visit. And I got the print-out ticket immediately.

The costs of these various transactions, which took me some 15 minutes to complete, were deducted immediately from my bank account in Holland. When I had finished, the screen reminded me of the complimentary call to which I was now entitled. So I called my daughter in the States, who wished me luck with my speech this evening. This was all I had to do. Naturally, I could have done rather more things if I had wanted to. I could have authorized a couple of international bank transfers or I could have taped a number of drafts from my office into my portable memory for editing whilst I am in London. I knew that the pocket terminal I had brought with me would be welcomed by the various private telecom carriers and they would be only too anxious to help me get it working and we would not be worrying about interconnexion problems. You might say—so what, how does all that, albeit a little futuristic, really differ from where we are now or where everyone says we are going to be at some time in the future?

The point I really wish to underline is that the system under which the development occurs determines the time or rate of achievement. Unfettered private enterprise, responding to the spur of competition, can speed the realisation today of projects that might otherwise have been considered a futuristic dream. State regulated monopolies cannot. If we wish to narrow the gap between Europe and the United States in information technology, there is a need for challenge and for drive. Nowhere is this more clearly stated than in the recent Pactel report designed to present a plan of action to the former National Enterprise Board and designed to give a degree of stimulus to action plans by U.K. companies. The proposals include the development and commercialism of specific products and services, the initiation of key products, and the adoption of new coherent long-term directions in Government policy. If these opportunities are not exploited, or are pursued only in a half-hearted or fragmented manner, the results are likely to be a U.K. trade deficit in information technology of over one billion pounds by 1990.

So you might argue that even this report is casting a role for government while I would appear to be advocating a complete withdrawal of government intervention. This is not the case; I see three phases in the growth of an industry such as ours.

The first is the development phase, where the emphasis is on the development of the technology itself. Here government assistance can be vital in getting industry started on the road. The next phase is the tricky one. Here the movement is from its development role to that of a fully fledged industry. Direct governmental support is not needed, but rather should be aimed at ensuring the availability of an adequate infrastructure for growth. The third phase is the operational mode, where growth can take care of itself. My plea, therefore, is for government involvement to be directed at improving the infrastructure and high on the list of priorities is the loosening of the regulatory strictures.

The information industry

I realize that quite a lot of what I have said has been carrying coals to Newcastle. In the United States, as a result of a series of deregulation measures, intensive competition in the communications field has become the order of the day. They have a flourishing information industry, far in advance of anything we have in Europe. Information consumers of all kinds have unrestricted access to a wide variety of efficient, low-cost services. As far as the United Kingdom is concerned, your politicians have taken a step in the right direction in following the successful American example. There is greater freedom here in the use of broadcasting as a medium, and the United Kingdom is the most advanced in data transmission of all European countries. If mainland Europe does not follow your example, differences will arise between the various member-states of the European Community, which will throw up inconsistencies in the much cherished free flow of information within the Community.

The information industry has come about as a result of the confluence of a number of previously separate information and communication disciplines, now forming one vast integrated information market. Today's media technology encompasses all of the technical inventions through which people communicate meaning and feeling, using sight and sound and the imagery of the mind. It includes print, photography, movies, radio, television, computers, broadcasting and data communications. This new industry must now begin to adopt a different stance and approach towards the influence of the state on the electronic media. State interference—and the expression is not too strong—has been going on for decades, and the point has been reached that it now seems to be taken entirely for granted. There should be a greater realization that state interference arose out of considerations which have now become obsolete. The new information technology has provided us with a virtually limitless communications capacity.

In principle, information should be considered in our society as being based primarily within the private sector and not so much in the public one. It is because large amounts of information are generated by government agencies or universities that it has gradually become unwittingly to be regarded as a public good. The ideal of a free and unimpeded flow of information is often confused with the Utopian view that information should be free of charge. In reality there are even items of information which the vast majority would never be able to afford. This is in no way different to the fact that a luxury yacht, a country house, or a private database are also beyond the means of the average citizen. Information is a commodity, to be handled, bought and sold just like any other commodity.

The information industry has to make crystal clear that broadcasting and telecommunications in the widest sense is our business, but that we are forced to operate within the legal limitations inherited from an earlier generation. And it is clear too that neither the government nor the public sector as such seem to attach any necessity to amending current, but obsolete, legislation. I believe that we must press more vigorously for changes in the present laws and regulations. There should be a greater awareness of the fact that after all politicians are only people. Our needs and interests are theirs too and they can be influenced just like the rest of us. Litigation can be another tool, and the resultant jurisprudence could be extremely valuable in establishing law in practice. In a nutshell, the information industry wants government to stop playing in its back yard.

The insidious invasion of the private information sector by the public sector is becoming a serious political problem. What it really amounts to is a gradual, perhaps unintentional, but nonetheless definite nationalization of information and communications. One does not need to be over-endowed with imagination to visualize the disastrous impact this would have on Western culture. If we wish to avoid Orwell's world, a reality in many countries already, we must make our politicians realise and appreciate the true nature of the problem and the unlimited opportunities offered by the information era.

A speech given some years ago now on the occasion of a technology exhibition embodies much of where I think we are in the information sector at the moment:

> 'Nobody (. . .) who has paid attention to the peculiar features of our present era, will doubt for a moment that we are living at a period of most wonderful transition, which tends rapidly to accomplish that great end, to which, indeed, all history points—the realization of the unity of mankind. (. . .) The distances which separated the different nations and parts of the globe are rapidly vanishing before the achievements of modern invention, and we can traverse them with incredible ease. (. . .) The Exhibition is to give us a true test and a living picture of the point of development at which the whole of mankind has arrived in this great task, and a new starting-point from which all nations will be able to direct their future exertions'.

The exhibition referred to was indeed a great success and represented what an unfettered society could do. It gave an immense display of manufacturing power housed in a triumph of new technology. Yes—you have guessed: the exhibition referred to was the Great Exhibition of 1851. And the speaker was the Prince Consort.

All I can do in conclusion is to echo the Prince Consort's words for our era of wonderful transition and trust that the lessons of what can be done in an unfettered environment are put into practice. If we do so, then we too have great opportunities, more than every before, to try and bring mankind together.

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Information Technology: the Department of Industry's role

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Paper presented at an Aslib Open Meeting, 29 March 1982

Introduction

AS I AM sure you know, 1982 has been designated Information Technology Year, and I would like to explain in this paper why the Prime Minister took this step and to outline the objectives of the Government's policy on Information Technology and how it aims to achieve these objectives.

There are two main reasons why the Government attaches so much importance to IT. Firstly, it is the fastest growing industrial sector in the world today. By the end of the decade the world market for IT products is expected to be around £150 billion. It is vital that the U.K. wins its share of that market, and to do this we must ensure that our industry does not fall behind in the race to develop new products and processes. Secondly, we must ensure that industry and commerce in this country adopt the new technology so that they remain competitive in all fields with the rest of the world. The implications of the Information Technology revolution are, I believe, as profound as the industrial revolution in the last century. In 1850, we were the most powerful, influential and technologically advanced nation in the world. The industrial revolution had its roots in the North of England, around 1740 to 1780. There was at that time a general energetic questing for experiment and innovation, based on shrewd heads and clever fingers. What knowledge we had was applied to the solving of practical problems; thus we developed massive water-powered textile mills. Watts developed his rotary steam engine; entrepreneurs pioneered the smelting of iron with coal and steam, and we made vast leaps in technology and productivity.

This upsurge continued until about 1850. Then we began to slip. As a nation we failed to realise that innovation was increasingly the result of systematic application of science to production, just at the time when our competitors were beginning to recognise that fact. In Britain we tended to concentrate on 'pure' science and to regard 'applied science' as somehow inferior. As a result, by the end of the century, we lagged behind our competitors particularly in those industries which depended most on applied science; these were mainly the chemical and the electrical industries, both of which were beginning to grow rapidly.

We must not make the same mistake again. People often express fears that IT will destroy jobs. There is conflicting evidence as to whether it will create or destroy jobs. But one thing is certain, more jobs will be lost through failure to take advantage of the vast IT market, and through failure to remain competitive by adopting the new technology, than from introducing the technology itself. Indeed if new technology helps British industry to increase its market share, there are likely to be greater job opportunities. One recent survey, published by the Policy Studies Institute, estimate that the use of microprocessors led to a net increase in employment. And the experience of Japan, Germany and the U.S. certainly bears this out. Our industry must match their efforts.

Government objectives

The Government attaches great importance to the new technologies, but one of the biggest problems is that the term is not widely understood. Indeed, recent surveys have shown that 80% or more of people don't know what IT is. I will be saying something later on about the steps Government is taking to remedy this state of affairs but I make the point now to underline the sort of difficulty you might come across. Conventionally, we explain IT as the application of microelectronics to information handling but this hides the enormity of the effects this application has in bringing about a convergence between previously separate disciplines and technologies, principally telecommunications, data processing and office machinery. Micro-processing technology therefore has an unusual effect in bringing previously disparate activities together and, from a business point of view, connecting previously unrelated businesses. The challenge for management is to connect those parts of your businesses which use converging technologies and to connect today's business successes with tomorrow's opportunities. In the same way that the distillation of crude oil into petrol for the early motor cars accelerated the development of the world's plastics industries, so will the distillation of information through the microchip give birth to vast new industries, the extent of which we are only now beginning to glimpse. Already the world market for IT products and services is well over £50 billion pa. Unless we take steps now the U.K. will have a balance of payments deficit in IT equipment of £1 billion by 1990. This cannot be allowed to happen. But it is not enough simply to know what is going on. The rate of technological innovation is increasing, and simply to survive as a major industrial and trading nation we must learn to take change in our stride and keep up with the field. To fail to do so would condemn this country to irreversible industrial, economic and social decline.

It is against this background that the Government has embarked on a major programme of initiatives to facilitate the development of IT in the U.K. It has three objectives:

—to raise the awareness of all potential users of IT to its possibilities;
—to encourage the development of new products and techniques through direct support and enlightened public purchasing;
—and to create the right environment and infrastructure which favours the growth and use of IT products and service.

Government initiatives

In the field of raising awareness, the major initiative this year is the designation of 1982 as Information Technology Year. The IT82 programmes will involve a series of exhibitions, seminars and special events being organised through a committee of various private sector and Government interests. The object of the Year is to bring home to people the importance of IT and to increase their awareness of the availability and application of IT products and services. The Year will be supported by appropriate studies, trials, demonstration projects and supporting literature. We will also have six mobile IT trailers travelling around the country during the Year. The highlight of the Year will be a major conference on IT to be opened by the Prime Minister in December at the Barbican Centre in London.

The process of increasing people's awareness is, however, one that has been going on for some time. For instance, the Microprocessor Applications Project began in 1978 for the purposes of increasing awareness, training consultancy and project support. So far, expenditure of more than £45 million out of the £55 million originally budgeted has either been committed or is under active consideration. Under the MAP programme:

—almost 160,000 people have attended workshops, seminars etc.
—over 34,000 extra training places on short-term courses have been created
—2,250 feasibility studies are being carried out
—some 600 new microprocessor development projects are underway involving a total investment of approximately £88 million.

Last year's major MAP awareness event was the Microtrain which from May made week-long visits to more than 20 major centres throughout Great Britain. About 41,000 people visited the train during the year. Our tasks for 1982 are to built on the interest which the MAP microtrain has generated; to target the MAP programme more closely to the needs of particular sectors, and to give greater publicity to successful projects.

We have also launched particular schemes to increase awareness of IT in specific sectors:

—the DOI 'Micros in Schools' scheme aims to put a microcomputer into every secondary school by the end of 1982. Already more than 2,500 secondary schools without a micro have taken advantage of the Department of Industry's 50% funding. The scheme has now been extended to cover those schools who already have a micro. So far, over 450 schools have applied under the terms of the extension.

—a national network of IT centres is being established in towns and cities around the U.K. as a joint initiative between the Department of Industry and the Manpower Services Commission. The centres will give unemployed young people training and work experience in microelectronics and computing skills and will be closely linked with high technology companies. The response from potential sponsors has been excellent and we have recently announced the setting up of the first thirty centres.

—the Government has served as a focal point for industry to initiate increased marketing activity for teletext and viewdata, as well as helping to develop a teletext promotional campaign aimed at the consumer, culminating in National Teletext Month during October 1981. Government has helped by amending legislation to enable halving minimum HP and rental down payments required for teletext and viewdata sets, providing 3 million consumer leaflets explaining in simple terms the teletext and viewdata services and producing and distributing a bi-monthly newsletter to industry to assist in communication between and within the various sectors of the industry and retail and rental trade.

—the Department has also agreed, following a successful trial with the National Computing Centre's own Microcomputer Centre in London, to provide a total of £600,000 in matching funds over three years towards the establishment of a national federation of centres at which advice and training will be available for businessmen and others who want to learn how to select and apply microcomputers. The NCC will be responsible, on behalf of the Department, for checking standards, producing course material and co-ordinating the development of the federation of centres.

Government support for R and D

Government also has an important role to play in encouraging the development of new IT products and services, through enlightened public spending and through direct support for Research and Development. For instance Departments and Public Bodies can take part in discussions with potential suppliers about their future requirements; they can encourage product innovation; they can specify their own needs in ways which are compatible with the needs of overseas markets. In particular, purchasers can enable companies to demonstrate new products or processes. The Micros in School scheme is one example of this. Our Office Automation strategy is another; here, the Department is working closely with the Central Computer and Telecommunications Agency and other public sector bodies to carry through a wide-ranging strategy for promoting office automation with five main elements: increasing awareness of the availability and benefits of office automation; the use of consultancy where appropriate; product development support; increasing the use by the public sector of currently available office automation equipment; and the mounting of exploratory trials of advanced preproduction systems. This last element, the mounting of eight to twelve 'office of the future' pilot projects has progressed well since it was first announced in June 1981: we announced the first three trials on 17 September, involving Xionics at the Cabinet Office IT Unit; Office Technology Ltd. (OTL) at British Rail Engineering in London and Derby; and IBM (U.K.) Ltd at Cambridgeshire County Council. These have been followed in November 1981 by Plessey Office Systems Ltd. at Nottinghamshire County Council and ICL and Data Recall Ltd. supplying two separate systems to SERC. The seventh, which I announced in January this year, was Rediffusion in the Information Technology Division of the Department of Industry.

The Department has allocated money for the *direct* support of various Information Technologies in the following ways:

—I have already mentioned the Microprocessor Applications Project. In addition there is the

—Microelectronic Industry Support Programme to which we have allocated £55 million—this is aimed at helping to create a capability for the development, design and manufacture of the custom-and industry-specific microchips that will be needed by user industries; encouraging the production of standard integrated circuits in the U.K.; and supporting companies supplying equipment, materials and services for the manufacture of silicon integrated circuits (the infrastructure industry).

—Then there is the Fibre optics and Opto-electronics Scheme to which we have allocated £25 million—this is a scheme to assist the fibre optics and opto-electronics industries. The objectives are to build up an industrial capability able to meet the needs of equipment companies and end users for optical fibre system components; and to build up the U.K. industrial competence in opto-electronic techniques and to produce a wider range of component products, with particular emphasis on critical components for novel systems.

—We have also allocated £10 million for Support for Industrial Robots—this scheme is designed to increase the use and manufacture of industrial robots by British industry. The programme includes 50% grants towards consultancy studies and 25% grants towards the capital and other costs associated with new robot installation and towards the development and bringing to commercial production by U.K. manufacturers of new types of robot.

—CAD/CAM Awareness Programme (£6 million)—a programme to promote the awareness of computer aided systems for design and manufacture and the adoption of these techniques through seminars, and courses, demonstration and experience centres and support for consultancy advice.

—CAD/MAT Programme (£9 million)—aimed at extending the use of computer aided design, manufacture and best technique by small and medium size firms.

—In addition £80 million of direct support has been put aside by Government over the next 4 years to help research, develop and manufacture other new products and processes in the IT field, and to raise awareness of IT in all sectors of the community.

All these schemes are demand related and actual out-turn may differ from forecasts, but in a full year of operation these allocations represent an annual expenditure of well over £60 million. Further support for Information Technology is provided by the Department's space programme, currently amounting to £53 million p.a., and by British Telecom's research programme, currently £100 million p.a.

In addition, the recent £130 million package of support for new technologies announced by the Chancellor in his budget will enable my Department to extend many of these existing schemes and to introduce new ones. The microprocessor applications project will be extended. New schemes will be introduced to equip primary schools with microcomputers, building on the secondary school programme already under way. More information technology centres will be set up.

We are also looking closely at the possibilities for extending the use of information technology in medicine, in consultation with the professional medical bodies and the D.H.S.S. The introduction of information technology in medicine will, I believe, provide real benefits to doctors and patients, including the disabled and handicapped.

In support of the supplying industries we shall extend the fibre optics scheme. A new software products scheme will be launched. In addition, the Chancellor's decision to extend 100% capital allowances on rented TV sets incorporating teletext will give the manufacturers of this leading British development an opportunity to consolidate the market position they have built up. Teletext is a major British achievement and I want to see it become even more successful.

Industry also faces the wider need to improve and modernise its production techniques in the face of increasingly sophisticated international competition. Part of the extra £130 million announced by the Chancellor will be used to extend our programmes of support for industry's own efforts in this direction. The existing and successful robotics support scheme will be maintained and, if necessary, extended. Additional funds will also be made available to assist industry with the costs of developing and installing flexible manufacturing systems. The step change in technology currently taking place in flexible manufacturing as a result of the application of electronics, robots and linked machine tools provides British industry with the means to tighten production control, reduce work in progress and respond rapidly to market change.

Encouragement of development of IT

I would now like to turn to the third aspect of our policy: the creation of the environment and infrastructure to stimulate the development and use of information technology. First of all, we recognise that a prior requisite for the growth of information technology is a favourable economic climate, and Government has seen this as a major task. This means, first and foremost, reducing inflation. The Government is also concerned to bring about, within the necessary constraints on public expenditure, changes which will encourage industry to improve its performance and pull itself out of the recession. There are limits on what Government can do in this direction: the main effort must come from industry itself. One important way in which Government can help to achieve this is by removing obstacles in the free and efficient operation of business. Many of these obstacles—pay, price, dividend and exchange controls—we have already removed: the removal of others remains a priority.

We can also ensure that more profit stays with the people and businesses which earn it, by reducing the weight of taxation on business and, in particular, shifting the burden of taxation to favour enterprise and commitment. For example the reduction in the National Insurance Surcharge announced in the recent Budget shows our determination to help British industry regain competitiveness. Also, Government has maintained the system of capital allowances, which allows businesses to set all of their expenditure on plant and machinery and 75% of their expenditure on industrial buildings against taxable profits for the year in which expenditure takes place. Together with the provisions for stock relief, these capital allowances mean that companies reinvesting profits into their business in the form of fixed assets and stock will be effectively relieved of taxation on a large proportion of those profits.

We recognise that for small firms the new technology can be expensive to adopt. That is one of the reasons we have introduced a number of measures specifically designed to improve the flow of finance to small businesses and to allow enterprise its full reward. The basic rate of income tax has been reduced and we have made substantial cuts in top level personal taxation. The 'small companies' rate of corporation tax is now only 40% and the upper limits have been raised so that more companies now qualify for the reduced rate. Added to this, the Business Start-up Scheme offers significant income tax relief to investors putting up to £20,000 into certain business start-ups.

The Loan Guarantee scheme, introduced in June 1981, has also proved very popular and to date over 2700 guarantees have been given on loans of nearly £100 million. I would just like to add that during the first few months of becoming a Minister opened new factories at a rate of about one a week, many of which were involved in the new technology. So there are opportunities here for firms of all sizes.

It is now clear that our policies for recovery are beginning to work. A slow recovery from the recession began last summer. Manufacturing productivity measured as output per head increased by 10% in 1981. U.K cost competitiveness also improved by about 10% last year, and the Budget proposals affirm the intention to consolidate improvements in the economic climate in order that industry can become more profitable. Rightly used, increased profitability can be an instrument for competitiveness, but there is no room for complacency. If we are to achieve more than just a one and for all jump in productivity, two things have got to happen. First, managements have got to build on what has been achieved and seek to extend and make more permanent the new atmosphere of co-operation and growth. Second, industry will have to strive as never before to become even more competitive and more efficient, both by using human resources more efficiently and by using the new technologies which are now available in your management and production processes. But as well as the right economic climate, it is also important that we ensure that the necessary infrastructure exists in this country to develop the full potential of IT, and that means very largely the telecommunications network.

Development of telecommunications

This country is on the brink of a revolution in the quantity and quality of its communications, and it is vital that we have an adequate telecommunications infrastructure to support the demands that will be placed upon it. The Government has therefore taken a number of steps to make sure we are prepared. Firstly, in July 1981 the British Telecommunications Act was passed by Parliament which, by enabling a substantial liberalisation of the Post Office's telecommunications monopoly will have a determining influence on the provision of the modern telecommunications that are so important to the application of information technology.

The Government intends to use the powers in the Act to give the sector much greater freedom to use the inland public network to provide value-added network services (VANS). Liberalisation will be phased to give British Telecommunications and U.K. industry time to prepare for the new regime. The Government is also liberalising over the next two years the supply of all telecommunications attachments, except the first telephone, subject to minimal technical standards to protect the network. And the most profound step has already been taken: a licence has been issued to the Mercury consortium to set up and run a competing telecommunications network totally independent of BT. This will give business users the choice of which service to use. Not even in the U.S., where local telephone monopolies still remain, can users choose in this way.

Secondly, the Government will be giving support to the development and application of new technologies such as direct broadcasting via satellite, and remote sensing. This programme complements the announcement on DBS licensing made by the Home Secretary on 4 March. Direct broadcasting via satellite, coupled with the potential for cable television, opens the way for a dramatic increase in the use of telecommunications in many activities of daily life as well as in entertainment. The third aspect of this policy is that of cabling. Cabling—or recabling as some prefer to call it, will be the biggest investment to be undertaken for the rest of this century. Some estimate that it will cost £2,500 million. The implications of this decision are therefore massive, not the least of which will be the economic activity generated by the growth of cable systems.

Last, but by no means least, is the question of standards. I am chairman of a committee—the Focus Committee—which seeks to encourage common standards for various forms of IT equipment and services to make sure that systems can inter-operate effectively. I doubt whether many purchasers have a single procurement point for purchasing an integral office system. At present most managers—and Government too—tend to operate a different purchasing regime for computers, for telecommunications equipment and for office machinery. Standards are therefore important, both for the home market and for compatibility in the international market.

Final comments

As you will see, the Government takes very seriously indeed its role in promoting IT, and we are determined to ensure that British industry is given every opportunity to participate in the enormous benefits IT offers. It is up to industry and commerce to do its part: it is a massive task but a vital one. The rewards are there if we succeed.

Unification of the results of online searches of several databases

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A NUMBER OF studies have shown that there is considerable overlap in coverage of primary journal items among the major abstracting and indexing services. For example, in a study of the coverage of published articles on the subject of biodeterioration, it was noted that of 1459 references retrieved by searching five computerised databases, 1105 (75.7%) were found in more than one base, and 673 (46.1%) were found in more than two databases[1]. Duplication of notification of published journal articles is not necessarily undesirable, because each notification increases the probability of a potentially useful article being read. With articles whose theme is of interest to workers in several different disciplines, it is clearly desirable that each disciplinary group be given the opportunity of using such articles, and many articles fall into this category; a paper on the reading habits of chemists, for instance, is potentially of interest to chemists, librarians and publishers, and its methodology may be of interest to social scientists. Duplication of retrieval of references is, however, a considerable nuisance to those who, in order to secure as complete a coverage as possible of a particular topic, or as complete an answer as possible to a particular question, find themselves having to search a number of databases online.

It was noted in the study quoted above that 'One solution (to the problem of securing comprehensive coverage) . . . is to acquire the tapes of the major services and either to meld them to produce one massive base which contains information relating to a wide range of disciplines, or to process incoming requests against a selected number of the bases sequentially, the appropriate selection being done either by the users or the system operators. Merging tapes to provide a unified base has proved to be technically very difficult, because of the lack of consistency of format or of data elements included among the major services, and both merging and the search of bases selectively have encountered the problem of overlap between services, so that in addition to recovering novel references from each base searched, the user also retrieves a number which he has already discovered, and, as it is sometimes impossible to structure a search so that this is avoided, the unfortunate user finds himself paying several times for each reference he finally retains'. In fact, there are two sorts of cost incurred by searching several databases with the same query, one cost being that associated with retrieving duplicate references, and the other that associated either with scanning duplicate references, if an end user, or eliminating them from the consolidated search product, if an intermediary.

From the user's point of view, there appear to be two basic approaches to the problem of retrieval of duplicate references, apart from simply living with it. The first approach is by some means to avoid retrieving the same reference more than once, which avoids both types of cost mentioned above, and the second is to suffer the duplicate retrieval, but to eliminate the duplicates by some mechanical means before using the consolidated search product. Both approaches imply the use of an intelligent terminal, or a microcomputer adapted to operate as a terminal. If only a limited level of current awareness is required, to meet a continuing requirement, it is of course possible to conduct studies to determine the amounts of overlap to be expected in searching a range of bases with a particular search statement, and then to search that combination which gives the least overlap, but this is done at the penalty of a severely reduced coverage of the search topic, and is not therefore discussed further, except to note that when the requirement is for 'something about . . .' rather than 'all that can be found about . . .', practitioners will normally search only that base which experience has shown to be the most productive.

Implementation of the first approach, of arranging not to retrieve references already found, involves writing search statements in such a way that each reference is retrieved only once. It has already been suggested[2] that if it were known which journals are covered comprehensively by particular databases, then items retrieved from base A and originating in journals known to be covered comprehensively by base B could be excluded from re-retrieval in searching base B by using the appropriate journal titles as NOT elements in a search statement. However, it is not usually known which titles are covered comprehensively, and even if it were, this approach would only provide a partial remedy because of the large numbers of journals which are only abstracted or indexed selectively. A more effective approach would be to develop a search statement to which each reference was added, as it was retrieved, as a NOT term. There are a number of limitations to this approach, some imposed by the size of the resulting search statement, which in many cases would rapidly become very long. A search statement with two thousand terms is not very manageable, would probably exceed the memory capacity of a microcomputer, would produce excessively long (and therefore costly) search times, and might often run foul of limitations on search statement size imposed by database operators.

Another objection is that a bibliographic reference, as retrieved, contains a number of elements, each of which could be used as a search term, so that it would be necessary to select from the retrieved reference a minimum set of elements which would both identify the reference without ambiguity and be suitable for use as a NOT term in a search. The set of elements should be able to be selected by algorithm. The usual searchable data elements in bibliographic databases are author(s), title of article in original language, translated title of article, original language of article, journal title, volume, number and year, so that if elements of a retrieved reference are to be used as logical NOTs in a search statement, they must be drawn from this set of elements. Only volume, number and year can be confidently assumed to be represented in exactly the same way whatever the databases; journal titles are abbreviated in a variety of ways, article titles can be slightly truncated by having articles dropped (although this is unlikely to matter much), titles can be translated in different ways, and conventions for dealing with authors' names (and multiple authors) vary considerably. Volume, number and year is not a sufficient subset to act as a unique identifier of a journal article, because cases of more than one paper by an author in the same issue of a journal are not uncommon. Pagination added to volume, number and year would provide a virtually unique identifier, but pagination is not usually available as a searchable field.

These problems were encountered by Linn[3]. He notes that 'Differences in style, spelling, punctuation, conventions and so on mean that the identification of elements which uniquely identify any item in any database, and which are themselves identical in each database, will be very difficult'. In effect, there is no practicable way at present to avoid retrieving duplicate references when searching a number of databases for information on the same topic, so that the first sort of cost, payment for duplicate retrieval cannot be avoided. If database producers made pagination a searchable field, the prospects for avoiding this cost would be greatly improved.

The problem now becomes that of identifying duplicate references and removing them from the final search product as presented to the user, or from a master file of references to be used by a library or information department as its internal database.

A first approach to this problem is to imagine a method by which a search statement would be entered in the usual way at the beginning of a session. References retrieved from the first database to be searched would be put through a program, as they were retrieved, to generate for each reference a unique identifier which could be used as a sort key in ordering the references. This unique identifier would then be entered into a file. References retrieved from databases searched subsequently would be put through the same unique identifier generating program, and their identifiers would be matched with those held on the file. If not already in the file, the reference would be retained, and its identifier added to the file; if already on the file, it would be discarded. Under this regime, using a microcomputer as a terminal, a disk or cassette file of retrieved references would be built up, and a file of unique identifiers would be held in RAM for matching purposes. The RAM would also have to house the search statement, the software for deriving unique identifiers and matching them against the unique reference file, the last reference retrieved and software for transferring it to disk if necessary. If this approach proved practicable, it would have the defect that connect time would be extended, while the generation and comparison of unique identifiers was taking place. It is probable that the costs of extra connect time would outweigh any benefits of discarding the duplicates at the time of search.

An alternative procedure, using more disk space but less RAM, and not demanding more connect time while searching, is to do the required searches in sequence, writing the products of each search onto disk in separate blocks. When searching has been completed, the blocks of references would be melded to produce a unified listing. Melding of lists of references has been studied by Hartley of the United Kingdom Chemical Information Service[4], who considered that there were three problem areas. The first area is that of recognition of identification of documents, which is treated by developing matching keys (unique identifiers) and using these to eliminate duplicate references. The second area is that of the varying information content of retrieved references. In principle, 'the aim should be to retain the maximum amount of useful information without redundancy', so that 'fields of information which are present in only one database should presumably be retained'. If, however, different abstracts are present in different databases, a decision on which to retain must be taken by the searcher. The third problem area is that of currency of bibliographic databases. If all that is required is to eliminate duplicates from the searches of several bases carried out on only one occasion, then the problem does not arise, but if the object of searching several bases is to create an internally-searchable master file over a period of time, then the substantial differences in currency between databases must be taken into account; in effect, potential matches must be sought between newly-retrieved references and at least a year's back-run of the master file.

The UKCIS study generated software for searching and melding output from CA Condensates, BIOSIS and MEDLARS (18 programs altogether), and it is noted that a separate program is used to generate the identifiers, for each database searched. The best keys for matching for all pairs of databases in the UKCIS study were shown to be those composed of the year, the first page number, the last page number, the number of authors, the first two characters of the first author surname and the first two characters of the first author initials. This key successfully identified at least 93% of the matches present in all pairs of databases. A number of other unique (or nearly unique) identifiers have been suggested by others. Tukey[5], developing document tags for citable items, proposed a number of tag types, depending on the document to be tagged; his basic format for 'simple serial items' is made up of the last two digits of the year of issue, three characters from the name of the first author, three digits for the volume number, four characters for the title and four digits for the first page of the item. The selection of characters for author's names and journal titles is governed by a set of rules. Linn reports the Pollution Information Project (National Science Library of Canada) as using a key based on the last four characters of an author's surname, the starting pagination and a database code. He also reports Loughborough as having devised several keys to provide varying levels of duplicate identification. Hartley reports The Oxford Experimental Information Unit as using a key consisting of author name, coden, volume number and first page number to identify duplicate references retrieved in searches on a number of databases.

The interest of Aslib in this question was originally aroused by the problem, already stated, of avoiding or minimising the effect of retrieval of duplicate references when searching several databases, and the present brief study was undertaken with a view to examining the possibility of using a microcomputer in some way to provide a solution. It was originally hoped that a microcomputer could be used as a terminal, to do the actual searching, and then either as a selection device during search, avoiding retrieval of duplicates algorithmically, or as a storage and sort device once the searches had been completed. The Research and Consultancy Division has already used a RML 380Z Micro as a terminal, and many other instances have been reported in the literature (e.g.[6]). We know also that it is possible to write the retrieved references to tape or disk for subsequent manipulation. It is now clear that, given the constraints mentioned above, it is not a practical proposition to avoid retrieving duplicates, so that the problem becomes that of melding the several lists arising from multiple database search.

One approach is to operate on the basis of creating unique identifiers, using these as sort keys to produce a unified list of identifiers, and then printing the references associated with the identifiers in the sorted order. (If the identifiers were required to be sorted in a way that would produce a satisfactory ordering by, for example, first author or journal title, this would demand an identifier of considerably greater sophistication than has yet been suggested). This approach means the creation of software for generating the identifiers, probably a different program for each base searched, a sort program, a program for retrieving the references to be printed, and a program for printing them. The micro memory would have to hold the program being used at the time, and the data being operated on. No attempt has yet been made in Aslib to generate the necessary software, or to estimate the memory size needed.

This approach has been adopted in principle by Riley, Bell and Finucane[7], in producing duplicate-free listings from searches carried out on the SDC System, for SDI purposes. The SDC system labels author and title fields of references with a two letter mnemonic, thus making their identification easy. The program used by Riley *et al* takes the first three letters of the first word in the title, the first two of the second word and the first letter of the third word, together with the first four letters of the author, and uses the resulting string as an identifier. Searches are stored on disc before generating the identifiers, and citations called from the disc for printing after a bubble sort of the identifiers. Because the program is used in SDI searching, which normally results in fewer retrieved references than a full retrospective search, a relatively unsophisticated identifier can be used, although the authors note that it occasionally operates to eliminate references which are not true duplicates. Use for searches on a system which clearly labels author and title fields also simplifies the problem. The authors note that the program, which is run on a Hewlett Packard 2649 CRT terminal with BASIC Interpreter and a floppy disc unit, takes a very long time to run, and they recommend use of a minicomputer.

An alternative procedure is to store each search product on a separate file, and instead of generating identifiers, to put each retrieved reference through a reformatting program, so that all retrieved references would finally be held in their separate files in a standard format. These files could then be sorted and merged, probably in blocks, using first author or any other desirable sort key, to produce a final unified list. For this approach, programs for each database would have to be developed, to handle the reformatting. In both cases, the programs to handle the references, either for reformatting or for producing identifiers, would probably be lengthy and complex. At this point, no judgement can be made as to which approach might be the more successful.

Another motive for exploring this issue, basically the issue of unambiguous document identification, has recently become apparent, with the publication of proposals to introduce electronic document delivery systems[8]. These systems would allow references selected from online searches to be switched directly to a remote service point, which would identify and locate the requested documents, and transmit them in facsimile or telex-type copy to the requester. Such systems clearly require a means of describing documents in a way that is recognisable by both an online terminal and an electronic delivery system, without human intervention. In order to avoid multiple requests for the same document, arising from searches carried out on several bibliographic databases, a mechanism, preferably automated, is required for eliminating duplicate references at the requester's end.

This brief report is intended to do no more than identify some of the problems to be faced in the handling of duplicate references arising from online searches. Other problems, such as those of copyright in use of retrieved references and of payment for references retrieved from more than one base and subsequently repackaged for resale, have not been considered. For the present, it is suggested that the best way forward would be to explore the software requirements for the two alternative procedures described above, and possibly to write some programs for practical experiment. Whether this will be undertaken by Aslib or not has yet to be decided.

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The provision of a library and information service to Northern Regional Health Authority trained nursing and paramedical staff by Newcastle upon Tyne Polytechnic

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The introduction, establishment and evaluation of a regional library and information service for trained nursing and paramedical staff by Newcastle upon Tyne Polytechnic Library is described. Problems encountered by users and the Library in the running of the service are detailed. Future developments to improve the service are also suggested.

THE NHS REGIONAL Library Group found in 1970 that the Northern Region was the poorest of all English health regions in terms of the numbers of qualified library staff employed in relation to population[1]. The Northern Regional Health Authority stretches from the Scottish to the Yorkshire borders and from the east to west coast, an area of 5,950 square miles. Approximately 20,000 staff working within the 16 district health authorities which comprise the Region are entitled to use the service.

Existing library services for qualified NHS staff

Newcastle upon Tyne University has been offering a regional library service for several years but by the nature of its book stock and journals holdings, was orientated towards medical staff. At district levels, provisions varied from excellent multidisciplinary libraries to cupboards of out-dated textbooks supervised by nurse tutors. On the whole, community health staff were poorly served with the majority not being aware of existing library provisions. In 1978 there were no qualified library staff reported to work in school of nursing libraries[2].

Newcastle upon Tyne Polytechnic Library

This sparsity of library services for trained nursing and paramedical (physiotherapy, occupational therapy) staff resulted in moves being made to extend the facilities of Newcastle upon Tyne Polytechnic Library to them. The Polytechnic Library had been providing material for a variety of nursing courses for over a decade with the stock being built up from 400 books and 10 journals to 36,000 books and 425 journals. Nursing was considered an area of excellence with funds made available to purchase all that was considered suitable and worthwhile in the English language. User education was an integral part of all nursing courses and consisted of input from library staff and lecturers from the School of Librarianship. Information retrieval courses were extended to trained nursing staff working in the Northern Region and throughout the United Kingdom. The subsequent demand for information from people who had attended these courses underlined the sparsity of existing services. A proposal was made that Newcastle upon Tyne Polytechnic Library should provide a regional library service for trained nursing and paramedical staff.

Discussions between the Polytechnic and the Regional Health Authority formalised the arrangement. It was decided that the Regional Health Authority would provide finance for the service for a two year period. During this time a detailed evaluation would be undertaken to establish whether the service should continue. Although the funds were made available in October 1979, the service did not commence until January 1980 when a librarian directly responsible for the service was appointed. The Polytechnic is organized into eight faculties and this arrangement is mirrored in the library where there are subject staff responsible for library services to each faculty. The Regional Health Authority service is administered by library staff also responsible for the Faculty of Community and Social Studies collection. Apart from health studies related courses run within this Faculty subject areas also include psychology, sociology and social work. Subject specialists are available for each faculty 6 days a week, and provide a 63 hour per week coverage.

Establishing the service

It was realised that where there were existing NHS librarians and good library facilities the Polytechnic Library would be more of a back-up than a primary source for material. Brember and Leggate[3] identified four factors affecting the development of NHS library services. These are professional diversity of NHS staff, geographical dispersion of staff, literature dispersion and lack of co-ordination. In supplying a service to such a large area, Polytechnic library staff were very much aware of the geographic dispersion of users. It was realised that some form of personal contact was needed between RHA employees and the Polytechnic Library. Nominations were sought from within the Regional Health Authority for liaison officers from each health district. A meeting was held with those nominated where the facilities available and procedures were discussed. Posters and leaflets detailing the Polytechnic and University services were given to the liaison officers for distribution. The Regional Health Authority Public Relations Officer notified the local and nursing press regarding the commencement of the service.

In order to identify users' expectations of the service Polytechnic Library staff visited each district. Directors of nurse education were contacted and asked to organise meetings with a wide range of staff. These enabled Library staff to outline the mechanics of the service and nurses and paramedics to propose suggestions.

Evaluation

The Polytechnic Library had to publicise, establish and evaluate the service in less than two years. From the outset various systems were implemented to provide data for the report. The Polytechnic Computer Unit supplied two valuable sources of information. A weekly computer print-out supplied figures of the number of registered borrowers, the number of registered borrowers with items on loan and the number of items on loan to them. This was achieved by allocating RHA borrowers a unique code in their reader number which could be identified in the library computerized issue system. By using the same reader codes, quarterly print-outs were received listing items on loan to RHA borrowers arranged in classified number order. The most popular subject areas could thus be identified. Another valuable source were the borrowers' registration cards from which the occupations and geographical distribution of users could be identified. Library staff involved with the service also kept accurate records of time spent on various tasks connected with the service.

For the evaluation report four groups completed questionnaires: librarians, liaison officers, users, and a random sample of eligible users. A wide range of questions were asked on nurses' awareness of the service, their use of other libraries, their criticisms of the service and their suggested improvements. By combining the information from this range of sources the RHA Nursing Research Liaison Officer[4] was able to submit the report to the Region after the initial two years.

Lending service

The number of NHS staff registered with the Polytechnic Library has grown steadily since the service commenced rising from 189 in 1980 to 2,010 in February 1982. The number of items on loan at any one time also increased from 330 to 990 over the same period. A crucial factor in the functioning of lending service has been the Regional Health Authority van transport system. Apart from users borrowing material personally, everything else is sent and returned using the transport system. The obvious advantage of this method is that no postage charges are incurred, either by the Polytechnic Library or the borrower. One factor that has emerged has been the heavy useage made by community health staff (district nurses, health visitors) and this is borne out in Table 1. showing the occupational groups of borrowers.

TABLE 1. *Occupational groups of Northern Regional Health Authority registered borrower*

Staff nurses	20%
Charge nurses/sisters	18%
District nurses	14%
Health visitors	14%
Nurse teachers	10%
Nursing officers	9%
Other nurse administrators	8%
Student midwives	3%
Midwives	3%
School nurses	2%
Others	8%
Physiotherapists	3%
Occupational therapists	1%
	N = 1150

21% of these borrowers worked within the Newcastle Area Health District with 49% working in the 6 adjoining districts. The remaining 9 districts provided about 3% each of the remaining number.

One surprising point that came out in the evaluation was that even though the number of registered borrowers and the number of items on loan increased significantly the number of borrowers with material on loan remained at about 230. This can be explained by librarians borrowing items on behalf of individuals on their own tickets. Even though the librarian might borrow material for 20 people it would appear as one in the figures.

NHS librarians are helped in selecting items from the Library by being able to receive the library microfiche catalogue. They can receive monthly updated copies of the name/title and classified catalogue as well as a serials listing. In response to requests from librarians and users a separate audio-visual aid list was compiled and circulated throughout the Region.

Nursing and health services material account for just over half of all material borrowed with sociology, psychology, science and education being other significant areas. The limited use of other subjects is occasioned by those doing further study through Open University and for 'O' and 'A' levels as well as by librarians themselves using the librarianship stock.

Photocopying

Any nurse or paramedic can request a photocopy of any article available from the Library. The number of photocopied pages supplied has increased every four months (from 724 in January-April 1980 to 2,666 in January-April 1981). A major concern was to implement a system for payment whereby an individual could request a photocopy even if they do not have a librarian to act as an intermediary. An invoice is sent every four months to each district treasurer detailing the number of photocopied pages supplied to the listed individuals working in that district.

TABLE 2. *Use made by registered borrowers of the various subject areas in Newcastle Polytechnic Library*

Nursing	35%
Sociology	17%
Gramophone records	7%
Psychology	6%
Education	5%
Science	4%
Geography and history	4%
Art	4%
Literature	4%
Management	3%
Economics	3%
Law	3%
Engineering	2%
Government publications	2%
Librarianship	1%
Theology	1%
Philosophy	1%
Language	1%

Polytechnic Library staff have seen the service as being both a library and an information service. Bond[5] has described the thought behind an information service: 'an information service has both a reactive element that responds to user requests and also an active element in disseminating new information to those for whom it has relevance'. The following four sections describe the components of the information side of the service.

Literature searching

Providing literature searches has evolved into an important aspect of the service for two reasons. The majority of nurses in the Northern Region have no other source where they can submit subject requests. In addition few NHS librarians in the Region have access to an adequate range of subject bibliographies, indexes and abstracts. A total number of 107 searches were completed over an 18 month period. The Library has facilities for computer literature searching which provides a fuller search and the librarians' time can be used more economically, but these had to be paid for on request whereas manual searches are part of the basic RHA annual payment.

Current awareness service

Nurses have a long recognised reluctance to read professional literature which Barnett[6] has underlined in reporting a study of nurses' awareness of Royal College of Nursing studies as a yardstick of their willingness to read. This knowledge of nurses' attitudes towards reading resulted in a current awareness service structured to make it as easy as possible for nurses to keep themselves up-to-date in their field.

A monthly bulletin is produced which indexes relevant journal articles and lists recent additions to the library stock. There tends to be a time delay of about two months between an item appearing in print and it being included in the bulletin. Three professional librarians provide the input of journal articles covering health sciences, nursing, sociology, social work and psychology. Other subject specialists in the Polytechnic Library contribute relevant cross-over articles. Liaison officers and NHS librarians receive multiple copies to distribute to personnel within their districts.

The current awareness service has evolved from a single sequence of very specific headings (incontinence, senile dementia) into nineteen broader separate listings (medicine, geriatrics) with further divisions within these broader headings. This enables users to receive only the sections relevant to their needs. Librarians and liaison officers also receive a cumulated issue which includes all the separate sections.

The preparation of this aspect of the service accounts for approximately 46 professional and clerical hours per issue excluding the initial indexing of the journals. This effort has been justified not only because it helps nurses keep up-to-date but it is also an effective publicity medium. NHS librarians have found that it extends their service onto the wards and people who would not normally use libraries are encouraged to do so. The production of this bulletin is, of course, the sort of thing which a small unit would find impossible to do.

Books on approval

A significant percentage of users live and work in remote areas and correspondingly do not have access to specialised book shops where new titles can be viewed. It was therefore decided to set up a service whereby a collection of recently published health sciences books would be gathered together from which nurses could select titles before purchase. The Publishers Association arranged for major publishers to contribute their latest titles every four months. These titles are compiled into a list which is circulated throughout the Region. A feedback slip is included with each item requested for the benefit of the publisher and these slips and books are returned at the end of every four months.

This service has not been as well used as others but its potential has been reflected by one school of nursing basing its book selection on items selected from the list. It is questionable whether the time spent in administering has resulted in adequate useage. Two other Regional Health Authorities have noted this scheme and adapted it for their own purpose. They have had more success because the titles are taken to the readers as travelling displays with library staff in attendance.

User education

It is appropriate that the information retrieval sessions which germinated the idea for the Regional Library Service should continue to be an important aspect of the service. Sessions are arranged for a wide variety of staff, ranging from student nurses to those attending post-basic courses. They mostly take the format of practical exercises with library staff in attendance. These sessions have resulted in courses placing increased emphasis on literature use. Library staff also visit hospitals and health centres to publicise the service.

Problems

It would be unrealistic to assume that the service has been established without encountering any problems, either by the user or the Polytechnic Library itself. Nurses outside Newcastle upon Tyne rely on the telephone for communicating their requests but have found the line engaged or unmanned. There is an unavoidable time delay before some requests are satisfied, either because the item is already on loan or the work load is too great. Some borrowers have received overdue reminders for items that have been held up in the transport system.

One problem that has affected both parties has been the liaison officers' degree of involvement. They are a vital component of the service and their motivation and enthusiasm is crucial in the level of use in their district. Where the liaison officer is prepared to act as an effective intermediary the service is very well used but the reverse occurs when their involvement is minimal.

The Polytechnic Library has had to solve several problems since starting the service. At the outset the involvement of library staff not directly concerned with the service was not envisaged. The work loads of staff working with the issue and discharge system, reservations, general enquiries, government publications and other subject specialists have all been affected to some extent. NHS staffs' needs are different from those of academic lecturers and students, i.e. loan periods need to be longer and they tend not to be aware of 'library manners' so regulations have to be relaxed. The Polytechnic Library has too many library staff for them to be aware of all the various aspects of the Regional library service. Another problem has been that typing and reprographic work is completed by central staff with resulting delays at certain times of the year.

Development

Since the service commenced various aspects have arisen that need refining. At present there are no standard request forms apart from those used by Newcastle upon Tyne University Library regional service, but it is hoped to have standard forms applicable to both services. Another possible development would be to extend the formal loan period by another two weeks to six. A new publicity leaflet will be circulated which will describe the services in greater detail and also inform users about their liaison officer's name. It is also hoped to transfer the audiovisual holdings list onto a word processor for updating purposes.

Future of the service

Both the Polytechnic and Northern Regional Health Authority have benefitted since the service was started in late 1979. The Library has extra funds for two more staff to assist in covering service points. The Polytechnic has been able to publicise itself to Regional Health Authority employees who may be interested in enrolling on courses held there. The Region has been able to have a regional library service using an existing library and its book and journal stock without having to build up a collection from nothing. This is obviously a much more economic method.

The continuation of the service was dependent upon the evaluation report submitted to the Northern Regional Health Authority in August 1981. The report concluded that the service had been well used but that there was still room for expansion. Funding will continue for another 3 years during which time a typical pattern of usage should emerge.

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Letters to the editor

CHARGING FOR INFORMATION

Martin Aylward, in his paper on Charging for Information in your issue of February 1982, argues, quite rightly, that there is no such thing as free information—in one way or another its collection, organisation and dissemination has to be paid for. However, his plea for a change in the balance of information provision between the public and private sector and his belief that information services would be enhanced by allowing the private sector to make money out of what hitherto has been provided without direct charge, is more dubious. Certainly the arguments he advances in support of his belief are questionable. I was particularly bemused by his reliance on the quotation from Rory Johnston's article in the 'Computer Weekly':

> '. . . use of on-line data banks in the United States went up by 1,500% over the last five years, while in Europe the corresponding rise was only about 200% . . . Businesses in Western Europe were not used to having to pay for information, because of the tradition of free public libraries'.

Did no one at the Conference challenge such fallacious reasoning? Anyone with any knowledge of the library systems of America and Europe will know that the tradition of free public libraries is nowhere more firmly entrenched than in the U.S.A. and, that in fact, it is in parts of Europe where this tradition is either weak or non-existent.

Anyone with any knowledge of library systems elsewhere in the world will also know that it is possible to stand Rory Johnston's argument on its head since under-utilised research libraries and documentation centres are a not infrequent phenomenon in those countries without well developed school and public library systems and which therefore lack a tradition of using recorded information. Is it not likely that public and privately funded information systems are inter-dependent, and that monetary values are not the only values which need to be applied when determining what shall be provided free and what shall be paid for?

E. M. Broome
County Librarian, Hertfordshire

SCIENCE REFERENCE LIBRARY COLLECTIONS

Your report of the discussion at the ABASG meeting in November 1981 contains the statement that, 'It was also essential for librarians to pressurise SRL into taking important materials that were missing from the collection'. This could, I fear, lead to some misunderstandings. Within our field of coverage (the natural sciences, engineering, invention and innovation, industrial property, technology and, more recently, business) our aim is to provide access to that material which our users need. Now it might well be imagined that taking, as we do, some 30,000 current serials there could be little of value which we do not hold but in practice a few things do slip through the net. We are always glad to learn of any that have slipped through provided we can be assured that they are worth taking and will be used if acquired.

The second point, though, is that it would appear that a significant number of titles are rarely used, if at all, and thus justify neither purchase nor valuable shelf space. At a time of stringency in acquisitions budgets, if we are to acquire the new titles which are necessary to ensure proper coverage of new or expanding fields—information technology and biotechnology to name but two—we can do so only by cancelling less necessary titles. Our priority is to provide full depth of coverage in economically important fields, particularly growing ones, if necessary at the expense of those of decreasing importance or decreasing inventiveness, and we are ready to respond to advice ('pressure' is rather a strong word) from users on how to apply that priority. In selecting little-used titles for cancellation, it is our normal practice to choose only those which are also taken by Lending Division, so that there remains one copy for British Library use and which can be made available in SRL if necessary. Nevertheless, it is very helpful if users—particularly users of the open-access collections—make us aware of items which they depend on our holding at the SRL as their means of access. It will be realised, I am sure, that reliable monitoring of the level of readership of the open-access stock is not really feasible, though we do from time to time make sample surveys.

Michael Hill
Director, Science Reference Library

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EDITED BY HEATHER TAYLOR

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Margaret Slater

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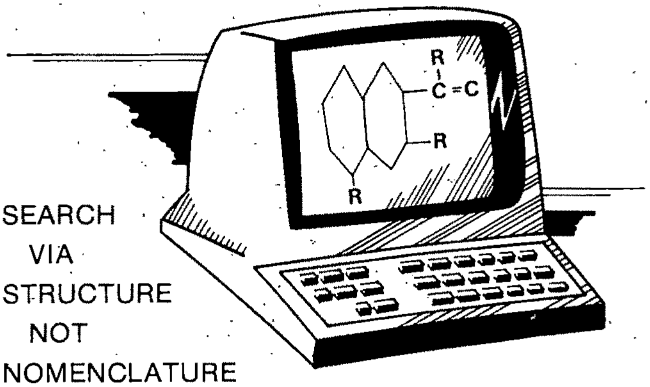

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New technology and marketing—the challenge for librarians

Blaise Cronin

Aslib Research and Consultancy Division

Paper presented at the Library Association's Medical, Health and Welfare Libraries Group's annual study school at Exeter University, July 1982

THOUGH I HAVE had little contact with the medical library profession, I do know that your group (Medical, Health and Welfare Libraries) is highly active and highly thought of throughout the profession. From my point of view, however, the grouping of three really quite different professional sub-groups under one banner presents a number of problems. If I'm to talk about marketing then I've got to take some note of the markets served by these three groups. Since the markets served by these groups are quite different from one another I can either attempt to say something which applies equally to all three, thereby missing some of the key differences, or I can attempt to touch individually on the problems and peculiarities of each sector in turn, but without going into sufficient detail to avoid generalities. As a group you are serving three very distinct user populations: medical professionals with highly frequent, demanding and specific information needs, a captive, if floating, patient population whose needs are less specific, more diffuse and less clearly defined and a broad base of administrators and planners. (See Fig. 1 below). This trichotomy is, of course, a gross oversimplification on a number of levels, but I mention it merely to show what I mean when I say that as a group you are aiming to serve a number of distinct markets. Keith Morton has referred to the National Health Service as an information market and I should like to quote what he had to say, since it confirms my first impressions as an outsider looking in.

> 'In this market there is no shortage of information: predigested material flows downward and laterally, and operational data grow in never-ending series. Users and potential users abound, for information and data are essential to the service's activities—patient-care, training and education, research, planning and management. The wholesalers, the middlemen and the customers are all present in this market, but the analogy breaks down with the realization that there is a dearth of packaging departments, salesmen and retail outlets'.[1]

If I've understood his point, then what he's saying is that there is a great deal more which could be done to channel information to potential users—and in this respect the librarian or information officer has a catalytic role to play. Your end-user populations, their backgrounds, expectations, and requirements (for information, educational or recreational materials) are extremely varied, and the resources and

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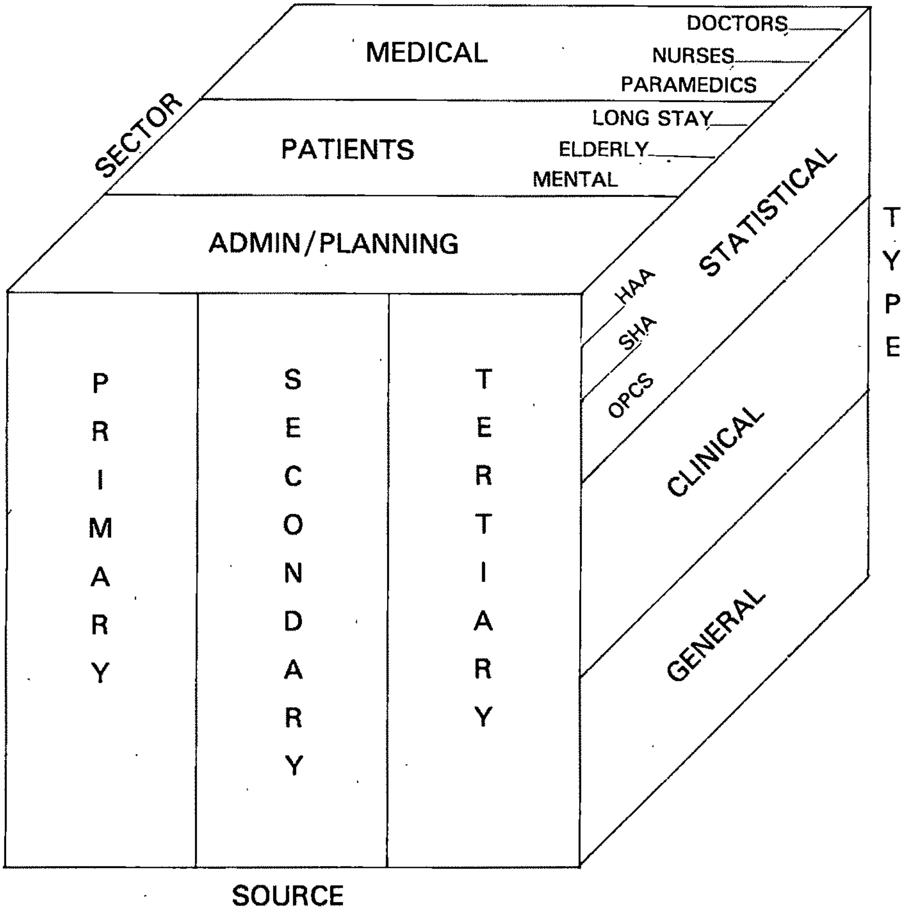


FIG. 1 *Information needs analysis*

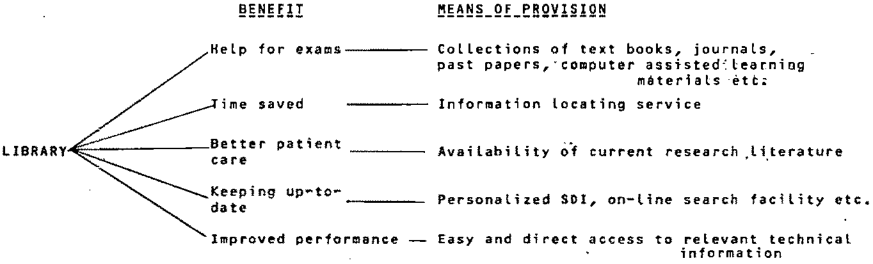
strategies necessary to satisfy their needs and wants equally varied. The salesmen in Morton's analogy are the trained intermediaries and it is they, in a sense, who are ultimately responsible for much of the packaging, advertising, selling and distribution of the information which is generated within the system.

Like many others in this field I've slipped into the habit of speaking of information as a commodity; a commodity like crude oil or cocoa beans, which has a value and which can be marketed. Librarians speak unselfconsciously of selling their services and of marketing information as it it were a tangible product. All this is very fine up to a point—certainly it's preferable to the tradition of diffidence, restraint and unimaginative promotion which for so long has been a hallmark of the profession, not just in this country but farther afield—but sometimes I get the feeling that the buzz words have taken on a life of their own, and behind the sparkling semantics is a half-baked understanding of what marketing entails. Not long ago I was reading a paper by Philip Gee which nicely deflated some of the nonsense talked about information being a product (and I don't exclude myself from the implied criticism!). Let me quote a little of what he had to say:

> . . . We must be clear what it is we are selling. I suggest that the product is not, in fact, information. We buy this from publishers. We do not create it, or alter it. What we are promoting, and of which we should be aware, is our knowledge, experience, competence, craftsmanship, comprehension of the client's uncertainty, and the net result of saving time. We sell help'.[2]

In saying this, Gee clearly recognises that the true function of the information professional is to act as an intermediary, a bridge between collections and resources and the end-user. Too often when we think of the librarian we think of the materials at his/her disposal, rather than in terms of the role played by the trained intermediary in closing the gap between information users and the available spectrum of primary, secondary and tertiary sources of information. I was reading an article recently which introduced the phrase 'boundary spanner' to convey the idea of the library as a link between an organization and the external world. But the link is a two-way link: to the outside world and into the operational domain of the user population.

Librarians need to think consciously in terms of what their users need from a particular service. They need to think in terms of the potential benefits to the user of using the services on offer. In marketing jargon, this is what is known as benefit segmentation (see Fig. 2). Benefit segmentation means analysing your user population from the point of view of derivable benefits. In other words: what's in it for the user—what does the user get out of using the service? It's a rather more sensitive approach than merely classifying your users as male or femlae, under 30 or over 30, black or white, houseman or consultant, psychiatric patient or handicapped child (see Fig. 3). Benefit segmentation makes you think in terms of the consequences of the service you are offering (or are proposing to offer). If you cannot identify likely benefits (and specific benefit-seeking groups) then it doesn't make a great deal of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LIBRARY
Help for exams
Collections of text books, journals, past papers, computer assisted learning materials etc.
Time saved
Information locating service
Better patient care
Availability of current research literature
Keeping up-to-date
Personalized SDI, on-line search facility etc.
Improved performance
Easy and direct access to relevant technical information

FIG. 2. *Benefit segmentation (illustrative)*

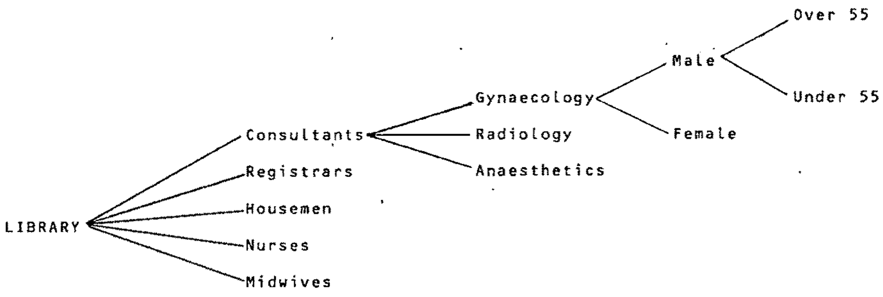

FIG. 3. *Market segmentation (illustrative)*

sense to carry on with the service you have. As Gee says, we are selling help, but help has different meanings for different groups at different times. It is the librarian's job to identify the sort of help required and then to structure services to ensure that the right sort of help can be given to the right group in the right way at the right time. Marketing is not—and it's important to stress this point—a box of tricks, a complicated set of management techniques, or a rag bag of quasi-mathematical formulae. Marketing, to put it very crudely, is just a particular way of looking at things. In essence, it means asking fundamental questions about a service's objectives, the characteristics of the user population, the quality of the service on offer, and the benefits derived by the users. There is naturally a lot more I could say, but it's probably better if you pick up one of the many available books on the subject. Let me recommend two which are both readable and aimed at librarians and information workers, David Yorke's *Marketing the library service*[3] and the Aslib Reader *The marketing of library and information services*.[4] If I had to sum up in one word what marketing meant, then I think I would choose the word proactive. Marketing is a management philosophy which aims to put the service provider (in this case the librarian) in the driving seat. The librarian, ideally speaking, does not simply react to service demands, but attempts to stimulate awareness of the service among as broad a user base as possible, to find out as much as possible about the information needs of the users (actual and potential) and to bring the service to his/her clients. This may mean leaving your desks and offices, abandoning rooms full of books or neglecting some of the traditional routines and housekeeping practices in favour of spirited and adventurous forays into the world of your users—something which all of you here today know only too well.

Embedded in what I'm saying is the assumption that the promotion of library services is *a priori* a good thing. If a library service works up a marketing plan and goes through the various stages of the marketing cycle (setting objectives, researching the user population, refining the product—in this case the service on offer—promoting and publicizing the service and finally evaluating the effectiveness of the whole exercise) and goes about the task with the requisite degree of care and common sense, then, all things being equal, there should be, if not an increase in the extent to which the service is used, at least an increase in the overall level of user satisfaction. No less important, it should gradually become clear to those who control the purse strings that the service is achieving its stated objectives in the desired fashion. A marketing programme which has been successfully implemented should do three things: it should increase user satisfaction, it should strengthen the library's case for continued (if not increased) funding and it should increase the job satisfaction of library staff. There is of course always the possibility that a stunningly well conceived marketing programme may stimulate demand to such an extent that the service is overloaded and unable to cope with the new pressures, but at the risk of sounding blasé I think this is a complaint which librarians should be happy to tolerate, at least in the short-term. One basic rule, though. Never promise what cannot be provided. Frustrated expectation among users can cause a disproportionate amount of harm, and may bring about a loss in the credibility of the library service. The trade-off is between a more productive and effective service (and the attendant increase in the library's organizational visibility) and extra work for the staff. Marketing can perhaps be summed up as a user-oriented service philosophy. It's quite possible to adopt a marketing approach to library management without actually using the word 'marketing'. I was reading an article by Jill Butler on library services in psychiatric hospitals, which without I think mentioning the term read like a marketing manifesto.[5] In fact, her paper included such a lot of sensible and refreshing suggestions that I'd like to quote a few of them to illustrate just what I mean. As I say, she is talking in relation to libraries in psychiatric hospitals, but I think the spirit of what she has to say applies generally.

> 'No matter how efficiently the service is run, the success of the library within the psychiatric hospital will largely depend upon the personality of the librarian.'
>
> 'Rules for the sake of rules are totally irrelevant within this field.'
>
> 'The library must be open when its readers are free.'
>
> 'Overdues may be sent but no particular significance should be attached.'
>
> 'Books for children should not be forgotten since . . . many patients revert to books known during their childhood.'
>
> 'Lack of high issue figures should not be a cause for concern.'
>
> 'It is wrong to assume that because readers seem confused when asking for a book that they do not really require it.'
>
> 'The number of books issued is not the most important factor of the service; rather the contact made with the words.'
>
> 'It is not the function of the librarian to censor patients' reading: librarians are not professionally qualified to judge the medical effect of books on patients.'

To an outsider like myself the scale and structure of the NHS—the framework within which I assume many of you operate—is bewilderingly large and complex. Before coming here I dug out a few indicative statistics to give myself a better idea of the theoretical size of your user populations. If we think in terms of the staff of the NHS, then we're talking in round figures of 35,000 doctors, 416,000 nursing and midwifery staff and 114,000 administrative and clerical staff.[6] Then of course there are the various postgraduate medical schools. The picture becomes even more complicated if primary health care (GPs, community nurses and health visitors) is included. Of the country's approximately 27,000 GPs about 15 per cent are currently Health Centre based and, therefore, deserving of NHS library support.[7] As far as medical librarianship is concerned, this large and heterogeneous population is served by 1,000 plus libraries, with a staff of 755 of whom only 250 are full-time professionally qualified librarians.[8] I'm quite sure that Roy Tabor was right in saying that medical libraries were only serving a section of the potential user population,[9] namely, those with special motivation, but it remains the case that in medicine the concept of information need is a reality rather than a convenient invention of the over-zealous or defensively-minded librarian. Medical literature is extensive, fast-growing and dispersed in the primary sources. For many medical professionals identifying and locating relevant information could be a full-time job in its own right, as, indeed, the Medical Information Review Panel noted in its report.

The first task facing the conscientious librarian is to identify barriers to information uptake. Why *do* doctors, consultants and GPs, make less use of the information available than we as information practitioners would like? Unless the librarian has some idea of the factors which inhibit use then there is little point in embarking on an enthusiastic publicity campaign. The promotion stage of the marketing cycle should only be set in motion once all relevant data on the users, their information seeking behaviour and their work environments has been gathered and analysed.

Before touching on some of the reasons why medical personnel under-utilise sources of information I'd like to read you a short extract from Margaret Slater's book *The neglected resource*, which looked at reasons for non-use and under-use of library and information services in a variety of occupational settings.[10]

> '... certain professions, grades and occupations and certain types of organisation or organisational structure, were particularly prone to non-use, under-use and misuse of the library-information services at their disposal ... middle aged or senior staff were also believed to be rather prone to non-use ... small expert groups marooned in large organisations were also thought likely to be non-users ... as far as personality *per se* went, non-users were often smug, complacent, slightly lazy people with a reluctance to change established behaviours ... a dramatically contrasting personality type, the complete antithesis of the inertia just described, may however also predispose to non-use. Such non-users were described as activists, professional loners, arrogant know-alls, jealous of their own professional expertise and disdainful or mistrustful of help from library-information staff. Certain kinds of work environment or atmosphere were believed to be conducive to non-use or minimal use. Cases where the management was not supportive of the library-information service and did not value information ...'

Can *you* see anything in this which fits in with your particular context? If so, what can you do to break down resistance or change attitudes where attitudes need to be changed?

There are many barriers to use, and any one (or combination thereof) may apply in a given situation. Use of an information service (in the traditional sense of the term) depends to a large extent on ease of access. If materials, advice or information are difficult to extract, then users will either do without information, or resort to alternative information-seeking strategies. Non-use is also on occasion a function of ignorance. Some doctors may be unaware of the existence of the library, or more specifically of the kinds of services and facilities it can offer. Other factors which contribute to non-use are lack of time, the perceived inadequacy or irrelevance of the service and lack of motivation among potential users (which may or may not be linked to previous experience, or expectations of the service). Ignorance of the library service, not of its actual existence, but what it can do and how it can help may also explain high levels of non-use. Lastly, but by no means least, is the absence of felt need among medical professionals. Perhaps it is here that the inventive and committed librarian can do most to affect change, by demonstrating in practical ways the relevance of the library service to an individual's professional development.

It is quite likely that in every professional group there is a substantial hard-core of non-users, who, no matter what, are going to remain 'dedicated' non-users. The medical profession is, I'm quite sure, no different in this respect from many other professional groups which have been surveyed over the years. Inevitably, one thinks of engineers. However, there still is a great deal which can be done. In broad terms, the librarian's goal should be to convert as many non-users into users as possible. Nonetheless I think it's fair to say that the cynic might retort by saying that there is no guarantee that such a conversion programme would make the individual a better person or a better professional (there is a disturbing lack of hard evidence to support the implicitly held view that information-conscious professionals are somehow better, less disadvantaged and more professionally on the ball than low information users, or non-users). However, *if* we accept the premise as being valid, then the librarian's job is to lead the non-user from a state of comparative ignorance to a state of grace or enlightenment. In diagrammatic terms, the process looks something like Fig. 4 below.

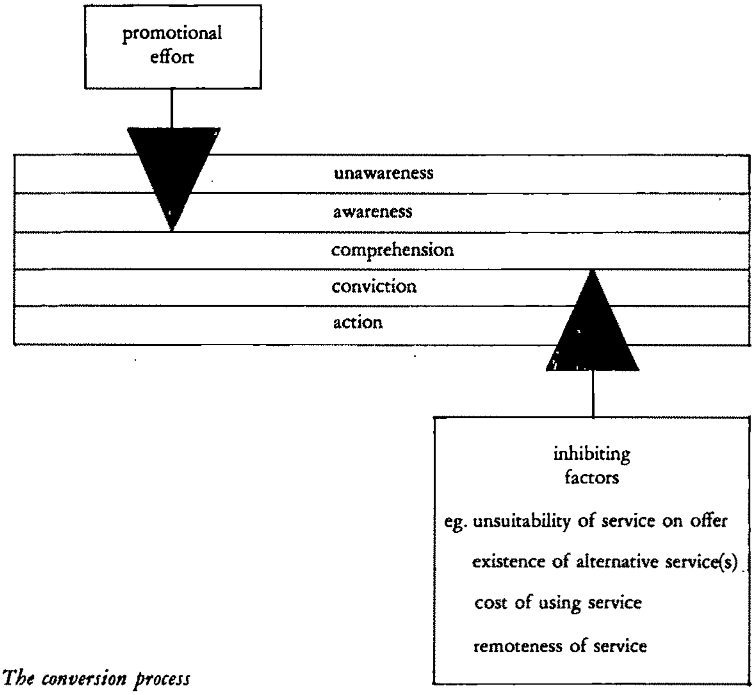

FIG. 4 *The conversion process*

The first thing to be done is to bring the existence of the service to the notice of the non-user. That done, this awareness (which need not impel the non-user to action) has to be amplified so that the individual begins to understand the significance of the library, what it does and what it can offer. But there is a further stage. The individual may now understand the function of the library, but he/she has still to be persuaded of its relevance. If this is successfully achieved, then the non-user will experiment. What we are talking about is a stretch process in which all the while the librarian's good intentions and promotional ingenuity will be set against a range of inhibiting or inertia-inducing factors, such as the effort-cost of using the service, the non-user's distaste of institutionalized information provision, the existence of alternative sources of information or the individual's preferred reliance on informal channels of information. To catch the non-user's imagination the library's publicity programme must be cleverly and clearly conceived. You may have the most marvellous library, with the most comprehensive catalogues and indexes; you may have shelf-miles of learned journals and a library sprinkled with online terminals, but unless you can persuade the medical staff to avail of all these goodies then you are, in a sense, failing in your professional duty. It is of course very easy to be critical, and it's very easy to exhort people to greater effort and imaginativeness, but not every library service is structured, organised and run primarily with the needs of the users in mind, rather than with the work or organizational convenience of the library staff in mind.

As I said earlier, the medical library profession serves a wide range of users. One of the key stages of the marketing cycle is the process of market research. Market research, which is to all intents and purposes synonymous with the user study, so beloved of this field, is the process of identifying the various component groups (or segments) of the market you are dealing with and discovering their principal features and characteristics. This process, let it be said, is not just an academic exercise or a fashionable adjunct to contemporary library management. The information thrown up by a market research exercise should enable you to target your services at differentiated groups (or sub-markets). Once you know who your likely clients are, and what distinguishes one group from another, then you're better positioned to tailor your services to their specific needs. Stretching a point, and at the risk of oversimplifying, you as a group have five potential markets: doctors, nursing staff, hospital administrators paramedics and technicians. The needs of these five groups may overlap marginally, but they effectively constitute five quite separate customer universes (to use the jargon, again). Priority provision is, I assume, granted to doctors and medical research workers. Yet, even within this group there will be an enormous range of subject areas, work styles and personality types to be accommodated. To say that doctors are the primary market of medical librarians (the 'heavy half' segment, as the phrase goes) is hardly going to convince you that marketing is capable of illumination, but I think it's important to go beyond the jumbo label 'doctor' and look at the needs, interests, attitudes and behaviour of the many specialist sub-groups which fall within your service orbit. Just take a look at the organizational chart I've taken from Fiona Picken McKay's book if you need to be reminded of the variety of client groups you are in fact serving[11] (See Fig. 5). Nothing will convince me that there aren't significant and important differences in the information seeking and using behaviours of these many specialist groups, and that a proper understanding of these differences is an essential prerequisite of a user-oriented service philosophy. Perhaps more important than differences in function or specialization are differences in status. It may well be that position or status within an organization has a greater shaping effect on information seeking and information using behaviour than an individual's subject specialization. But that's something which requires further exploration. It is temptingly easy to assume that information means exactly the same thing to haematologists as it does to psychiatrists or research biochemists, but I'd like to know if that is the case. Perhaps, you wouldn't find the same degree of difference as exists in general between hospital doctors and GPs,[12] but I would be curious to find out which, if any, of the reasons for non-use and under-use identified by Margaret Slater applied to your various sub-markets. You may laugh me out of court, but is there not a case for providing information services to all management strata of the NHS, if only to reinforce the relevance of the library service in the eyes of all concerned and to demonstrate the importance of the library service to hospital life generally? There is in fact a joint NHS/DHSS working party (The Körner Committee) investigating NHS handling of management information. It will be interesting to see what implications its conclusions will have for your group.

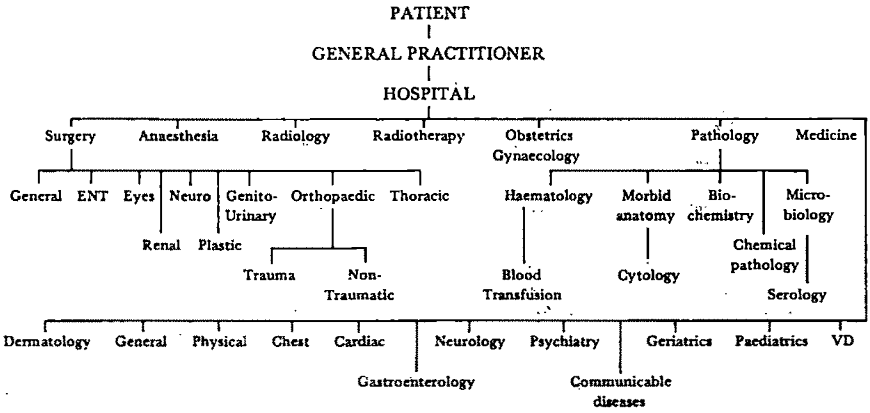

FIG. 5. *Hospital medical structure*

If you were a pet food manufacturer and wanted to break into the highly competitive dog food market, one of your first undertakings would be to assess the size and strength of the commercial competition. However wonderful your particular product, however subtle your pricing strategy, however ingenious your advertising portfolio and however impressive your distribution network you still have to win over people from brands with which they are familiar and with which, for whatever reasons, they identify. Logic, as research as demonstrated, plays a small part in an individual's propensity to buy. In trying to capture a significant market share a new product has to break down a variety of prejudices, traditions and loyalties. Objective excellence is no guarantee of a successful new product launch. Medical information is of course different from dog food — which is just as well from the patients' point of view!—but in trying to promote a library or information service, and in trying to inculcate an information-conscious attitude among doctors, the information intermediary is faced with some of the difficulties encountered by the would-be pet food manufacturer. In this analogy the competing brands are the alternative information-seeking practices of doctors. The library may not be the sole, nor even the most customer-convenient, information supplier. Other brands available to the doctor are as follows. First, there are personal collections, as in any academic or research-orientated institution. You can correct me if I'm wrong, but I would imagine that many consultants and senior medical staff have personal libraries or document collections of varying dimensions. Whether these can be formally designated libraries from a census point of view is a matter of definition, but the important point is that their existence encourages information self-reliance. Second, there is the existence of peer-group networks, both within and between departments and institutions. At the local level these informal clusters may reflect social groupings or be a natural by-product of research team specialization. On a broader level, these invisible colleges constitute an important communication facility, which to a considerable extent pre-empts information flow via the primary communication system. Thirdly, there is the existence of specialized information and referral centres outside and apart from the hospital library service, which an individual may turn to for a variety of reasons; for example a drug or poisons information unit. Together, these alternative (or complementary) approaches to library provision do not necessarily constitute a threat to the activities of the information profession. Arguably, a variety of personal, informal or highly specialized information supply channels and sources have always co-existed with traditional library services and, arguably, this is how things will continue. There is, however, a fourth alternative which may have more serious long-term implications (in some people's view) as far as the medical library profession is concerned, and it is in relation to this point that I would like to shift the focus of my discussion from conventional service delivery (library-centred, document-based and intermediary-controlled) to the idea of electronic self-service. And in doing this I hope to be able to show why what I call a marketing approach to information supply and provision is particularly apposite when coming to terms with technological and structural change within the library-information world, as we know it.

Firstly, I think it might be useful to break down the information used by the medical profession into two broad categories, since the two types of information tend to be gathered, handled and managed in rather different ways. Basically, at present, there is practitioner-processed information and intermediary-processed information. Intermediary-processed information consists of the scientific and technical literature (the subject literature) in its various forms and formats. This includes journals, monographs, reports, theses, abstracting and current awareness services and online databases and specialist databanks. Practitioner-processed information includes patient records and other related management data, product and performance data (on, for example, pharmaceutical products) and symptom data. Traditionally, I think I'm right in saying, these two categories of information have existed alongside one another, but remained quite separate from a management point of view. As long as the distinction was maintained, the trained intermediary had a distinct and recognised function to fulfill, not least since the global volume of literature was steadily increasing, as was the complexity of identifying, locating, processing, storing, retrieving and analysing it. However, the arrival of the electronic information age has begun to rattle the foundations of this convenient bipartite tradition, not just for medical librarians, but for the library-information profession at large. It's all very well to talk enthusiastically about the growth in the information marketplace, about the boom in information technology or to bandy about Machlup's much quoted figure that information accounts for more than 50 per cent of GNP in the US.[13] And it's easy to be impressed by the latest set of figures which suggest that there are now 1.6 million information workers in the US alone,[14] but the paradoxical corollary of these impressive indicators of growth in information related activities is the predicted contraction (not to say eventual demise) of the traditional librarian or information officer. It's easy to dismiss such prognostications as being overly fanciful, but the technology already exists to convert them to actuality. Reassuringly, from the librarian's viewpoint, most if not all developments in electronic information delivery systems are technology driven rather than demand pulled. In practice, this means that reality and what is possible differ considerably. At present, there is plenty of evidence to bear this out (just think of the below-expectation impact of Prestel on the domestic market), and a combination of social, behavioural, psychological and cultural factors are likely to ensure that the lag between potential and practice remains wide. The Bell System Picturephone is a classic illustration of how the adoption of technical innovation is dependent on psychological rather than financial, market or technological considerations. Nonetheless, the age of the 'systematic doctor', to use Professor John Anderson's term, is imminent.[15] Let me explain what is meant by the phrase the 'systematic doctor' and at the same time let me illustrate how user-friendly computer systems could begin to affect the relationship between the intermediary-controlled and the practitioner-controlled domains, at least as far as information provision for GPs is concerned.

Patient records are obvious candidates for computerisation. Thinking ahead, there is no good reason (apart from the tricky matter of security) why a national databank of patient records should not be established with individual doctors having real-time online access. At the primary care level it is predicted that fully integrated computing will soon become a reality. And there is no good reason why this should be restricted to patient record management, whether at the local or national level. Desktop computers for use in case history creation and symptom diagnosis will become commonplace in the consulting room, in both primary care and hospital environments.[16] More exciting still, is the much heralded operational launch of expert systems such as Mycin. Basically, an expert system consists of two elements: a knowledge base (the factual substance) and a set of inference procedures. The idea is that the doctor is guided via a reasoned query-response dialogue to the most likely diagnosis. The computer becomes in effect an infallible consultant, within its own terms, i.e. within its predetermined area of expertise. To use Professor Donald Michie's words, an expert system mimicks a domain specialist's top-of-the-head skills by using a series of pattern-driven situation-action rules.[17] If and when such systems become commercially available and accepted by the medical profession (and allowing for further quantum leaps in system sophistication over the next decade or two) then, in theory, there is a likelihood that the medical professional will become less dependent on the services and back-up of the traditional information intermediary—the medical librarian. Still, it's difficult to predict what will happen in terms of technical progress and what human reaction and levels of acceptance will be. Speculation is perhaps an idle pastime, but a number of warning signs for the library-information profession can be spotted in current trends.

Another factor likely to erode the intermediary's domain is the widespread availability of both public and private viewdata systems. In theory, Prestel could in due course become a real rival to the library as a source of reference materials and expertise, or it could be used, as has recently been tried, as a replacement for the 'yellow card' system whereby GPs notify drug companies of adverse reactions to their products. This makes the assumption that individual doctors have their own terminals, which may be a trifle optimistic given the general shortage of funds for capital projects within the Health Service. Private viewdata opens up the possibility of, say, drug companies making up-to-date product data easily available, or the establishment of specialist epidemiological databanks. Already, it is possible to access the world's major online databases using a Prestel terminal with a special interface. The Gateway concept, coupled with mass availability of low cost terminals in the years ahead suggests that the trend will be towards personalised information retrieval. Another area in which the medical profession may soon begin to notice a shift in habits is in the use of the primary literature. The importance of the primary communication system (in particular the peer-review and 'reward' system) to academics and researchers is as strong as ever, but there is no reason why the same system should not be maintained in an electronic fashion. The electronic journal is a reality, but even if the number of journals available electronically increases rapidly, there will still be a long spell of print-on-paper and electronic journal co-existence. Nonetheless, the electronic journal does in some respects pose a threat to the librarian, since it allows authors and readers to bypass the trained intermediary.

What is so often posited (and it really does not require any stretching of the technical imagination) is a research environment in which the end-user (the medical student, consultant or research worker), traditionally dependent on the intermediary, achieves independence thanks to the emergence of user-friendly electronic information (and document) delivery systems. The argument is very straightforward. The technology for end-user information storage, retrieval and manipulation exists, therefore the middleman (the library-information professional) is redundant. QED. Or is it? Personally I remain sceptical, certainly as far as the medical library profession is concerned. Granted in certain environments the information intermediary's functions will be gradually deinstitutionalized and we shall see a lot of what is currently referred to as functional convergence, as departmental and divisional boundaries in organizations slowly break up, but the basic hypothesis (the demise of the intermediary as we know him/her) ignores a couple of important points. First, it assumes that there is adequate finance to bring about the sort of change which is predicted and it assumes the existence of genuinely user-friendly, conversational systems; an assumption which at present seems a little premature.[18] It also makes a major behavioural assumption, i.e. that medical professionals would in any case have the desire or time to combine their professional duties with the ever-growing task of data retrieval and personal record management (through the recently developed Paperchase computer search program, designed to allow end-users to search the medical literature without formal instruction or a manual, may change existing practices). Additionally, it completely ignores the innate conservatism of the present generation of scientists and professionals in their information using practices. As you are all aware, many aspects of the medical profession are characterised by long hours and heavy clinical work loads. There is little if any slack which would allow even the most conscientious doctor to become and remain an all-purpose do-it-yourself information manager. I think it is possible to turn the 'Doomsday' argument on its head and show that the increased availability and sophistication of in-house and externally available systems and services makes it all the more essential, in a dynamic, complex and fast-moving subject field such as medicine, to have a highly trained, forward-looking and versatile corps of intermediaries. In conversations with colleagues I tend to hedge my bets as to the medium-term implications of the new technology on the future of the library-information profession (perdition or palingenesis . . .?), but I'm beginning to move towards the view that the subject librarian and information specialist have an assured future, providing the challenge is accepted. The library's role will certainly change, perhaps along the following lines (and this is a quote from a recent article in an American library journal which looked at the electronic environment of the future library);

> 'If libraries are to resist the challenges from competitive institutions, new and enhanced services will have to be available . . . Libraries will have to be prepared to teach how to use the electronic information environment, from assistance in program debugging to instruction in how to use one or more components of the system. In addition, libraries should be prepared to accept a major responsibility to act as information consultants in the formulation of search strategies, query construction, and evaluation of information quality . . . The library will act as a switching centre of a communications hub to the vast interlocking electronic network'.[19]

Let me follow that with another quote on this most topical of subjects, this time from yet another commentator who sees the librarian as the dinosaur of the information age.

> 'Librarians must be seen to provide a useful service in an electronic information age. They must not only become knowledgeable about information technologies; they must actively promote their function in providing information. In order to do this, they may have to abandon their rooms full of books. They will need to work along with data processing departments and the public at large in the business of providing useful information'.[20]

As far as I'm concerned the key words here are 'they must actively promote their function in providing information'. I'm inclined to feel that the advent of the electronic information age will force many librarians to think closely about the practical relevance of marketing theory and practice to their professional activities. If information intermediaries are the 'nervous system of the health service', to use Roy Tabor's expression,[21] then this fact should be capitalized on and shouted from the proverbial rooftops.

Marketing, let's be quite clear, is not synonymous with promotion, publicity or public relations. It's something bigger; a management framework within which these elements are located. The point about a marketing mentality is that it compels an organization or individual to ask and answer a number of basic questions about the goals, purpose and functions of a particular service. In attempting to answer these questions it is necessary to take stock of the markets you are supposed to be serving (or would like to serve) and to analyse their wants, needs and expectations. Only when this preliminary fact-finding exercise has been completed does it make sense to think about a programme or campaign of promotional activities. This process is not as abstract as it sounds. For example, I came across a recent publication aimed at librarians working in the prison library service. The manual (*Jail library service: a guide for librarians and jail administrators*) included step-by-step instructions on how to identify and describe the wants and needs of your user population.[22] It was, in effect, a practical aid to the application of marketing principles to the practice of librarianship. Whatever your label or designation (medical librarian, prison librarian, welfare librarian, hospital librarian) you still have to understand your users before you set about the task of designing services for them. There is not a class of person we can call library users: I'm not even sure if it makes sense to talk of the typical library user. Library useage is a frustratingly imprecise notion and doesn't make for easy planning, but market research is one way of pinning down some of the variables and arriving at a clearer understanding of why users behave as they do. The following quote from W. S. Haugh gives some idea of why market analysis and market segmentation is important in, for example, the context of the hospital library service.

> 'If hospital patients are a cross-section of the public at all, they are a cross section of the whole public, readers and non-readers alike, and are certainly not exclusively a cross-section of that 25 to 30 per cent of the public who are library users. General hospital patients are still less a cross section of the whole public in that sickness does not strike indiscriminately and evenly over the full range of age and sex but tends to strike most heavily on the very young and the ageing, and in the maternity field, for example, affects exclusively a narrow range of the female sex'.[23]

In the past few years there have been many examples of how medical, health and welfare library services have become more responsive to the needs of users (to the demands of the market place, if you like). One has only to think of the domicilary library service, talking newspapers for the blind, day centre collections, large print books, toy libraries. Each of these innovations represents a going beyond the traditional product or the traditional modes of service delivery, and each is an acknowledgement of the fact that the requirements of the user, though diverse and changing, should dictate the character of the service. Also, the debate which has grown up around the concept of bibliotheraphy has helped focus attention on the user and the benefits derived by the user, and helped clarify the profession's understanding of its role.

There are a number of obvious and traditional ways in which the visibility of a library service can be increased. According to the Medical Information Review Panel[24] the five most common were: (1) the circulation of a library newsletter/acquisitions list; (2) a tour of the library for new users; (3) printed guide to the library; (4) library instruction for specific groups; (5) external visits to doctors. Various other methods of publicizing the library were listed, including mounting displays and exhibitions. Before coming here I read two papers, one by Robert Gann,[25] the other by Martin Sanderson,[26] which discussed in some detail the 'why' and 'how' of medical library publicity and PR. Sanderson makes the point that medicine and nursing are highly visual disciplines which consequently need to use visual means in displaying the library's wares, and that publicity activities should be undertaken with a clear understanding of why they are being undertaken, for whom they are intended and what they should consist of. He also makes the point, and it's one which all librarians should heed, that displays and special promotional activities should be formally evaluated, and the feedback used to refine and improve future efforts. Robert Gann, in his paper, mentions the possibility of setting up a central collection of display materials which could be drawn upon by all libraries in a particular regional health authority. I would go a little further and urge you as a group to lobby, along with other sections of the profession, for some form of nationally coordinated provision of publicity, display and related materials. There are a number of good reasons why such a scheme should be considered, but the argument based on economies of scale is one of the most appealing. By centralizing and (up to a point) standardizing the range of materials to be produced it is possible to keep unit production costs tolerably low (certainly much lower than if the materials were to be produced locally, even on a participative basis). Some months ago I produced a report on this subject entitled *A national graphics resource centre for libraries in the UK.*[27] Behind the ungainly title lies a reasoned appeal for the establishment of a national centre, body (call it what you will), which would undertake the design, production, marketing and distribution of library graphics, posters, promotional aids, display materials and user instruction materials. With a few notable exceptions, in-house advertising by UK library services has not been stunningly successful. To expect otherwise would probably be naive and unrealistic. It's all very well to protest that libraries should attempt to imitate the commercial world, but at the present time libraries have neither the budgets nor the staff to allow them to produce high-quality publicity support materials. And the prospects for the indefinite future look equally unencouraging, hence the urgency for some action as regards a national initiative.

Marketing is to do with communication and exchange. The task of the librarian is to spread the word about the library service by opening up as many communication channels as possible within the organization or institution. In return for giving targeted, relevant service to its users the library receives patronage. It is this exchange of service for patronage which is the essence of a marketing approach to library management. The library's two mutually supportive goals are thus (a) to meet the needs of as many users as possible in the most effective manner possible and (b) to create a healthy dependence among the user population on the services offered by the library. Paramount in this, is the matter of benefits accruing to the users. Librarians need to be concerned less with quantitative performance measures (loan statistics, enquiry logs, processing statistics, inputting levels etc.) than with the benefits and satisfaction derived by the users. In practice this will mean greater flexibility in attitude and a willingness to seek out ways in which the library service could further contribute to the client groups it's serving. Marketing is not a dogma; it's an attitude of mind, one which, in my view, is encapsulated in the aims and ambitions of the clinical librarianship project,[28] which certainly took the librarian away from the relative comfort of the library to the operational reality of the hospital ward. I said earlier that marketing puts the librarian in the driving seat, but I think it's important to remember that the user is the paying passenger and in this sense the wishes of the customer have to take precedence over the whims and preferences of the driver. There is little point in driving with style and panache if you take the passenger to the wrong destination. That way you lose the custom for good.

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Language and information retrieval in the social sciences

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Based on a paper presented to the Fourth International Research Forum in Information Science (IRFIS 4) in Borås, Sweden, September 1981

> 'But "glory" doesn't mean "a nice knock-down argument",' Alice objected.
>
> 'When I use a word,' Humpty Dumpty said in rather a scornful tone, 'it means just what I choose it to mean—neither more nor less.'
>
> (Carroll, 1929).[1]

The role of language

'PLAIN ENGLISH', 'simple language' and 'good style' are frequently taken for granted. Yet, easily as such epithets may come to us, they, nevertheless, conceal issues concerning the use of language which are unlikely ever to be resolved in a satisfactory manner. The quotation from *Through the Looking Glass* illustrates one of the most enduring of these. Alice, perhaps because she is a child, supports the conservatives: strict rule-followers who believe that English words have fixed and invariable meanings. Into this category also come those who hope to purge our language of foreign (especially American) influences, much like those who wish to eliminate all traces of 'franglais' from the French language. Humpty Dumpty represents the liberals—those who feel that words can change their meanings according to circumstances. This allows him to close the argument by claiming that: 'I can explain all the poems that ever were invented—and a good many that haven't been invented just yet.'

Despite the frequency with which we hear complaints about the misuse of language, our ear for what is 'bad' or 'wrong' remains surprisingly stable. For example, a recent study of the top twenty complaints about BBC English revealed not only that virtually all of these points had been mentioned in an analysis of linguistic problems published 120 years ago, but also that many of them can even be found in discussions of language use as far back as the early seventeenth century![2]

The continuing nature of these debates may seem trivial, but they do show how important a part language plays in human society. It has been suggested that we are so concerned about using the 'right' words because we want to avoid being laughed at.[3] But this is only part of the answer. Language is important as a means of delineating social power and showing who is 'top dog'. Thus, for example, our words for domestic

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animals tend to be of English origin (and reflect the language of those who tended them), while the words for the edible versions of these same animals are derived from French, the language of those who prepared and ate them. Such distinctions still operate to keep members of different classes apart and the gap between 'U' and 'non-U' vocabularies remains as wide as ever.[4]

It is also important as an indicator of political power, as can be seen when we recall the impact that the oratory styles of men like Hitler, Churchill and Stalin have had on recent history. Many modern movements (feminism and Welsh nationalism are two examples) have demonstrated their awareness of this power by attempting to change society through its use of language. And the editor of the latest ***Roget's Thesaurus*** has tried to follow this trend by eliminating racist and sexist words.

The idea that by removing certain words from our speech we can influence our thought processes and our behaviour is a popular one. It implies that the kind of language we use has a direct effect on our attitudes towards the outside world or, to put it another way, 'we see and hear and otherwise experience very largely as we do because the language habits of our community pre-dispose us to certain interpretations.'[5] But, whether language is a creative force within society or merely a reflexion of it, is another issue which awaits resolution.

It is not only social and political divisions within society at large which are accentuated by the use of certain forms of language. Professional groups, such as doctors and lawyers, have developed specialist languages (or jargons) which facilitate communication between their own members, as well as serving to define the gap between insiders and outsiders. Such linguistic barriers play an important part, too, in scientific communication and usages in one discipline (or sub-discipline) may differ significantly from those in another. This is especially the case in the social sciences, where there are many specialised linguistic groups.

The role of language in communication seems to have been underplayed by information scientists who appear more inclined to treat it primarily as a vehicle for transmitting ideas, rather than as a possible source for these ideas. Perhaps, this is a result of our lack of knowledge of the part language plays both in the creative process generally and in the development of science in particular. Perhaps, too, it is due to the orientation of information science research, much of which is geared to the dissemination of ideas, instead of being concerned with the needs and habits of potential users and to whether or not they are able to convert the information they receive into usable knowledge. The effects of this can be compared with the case of social security benefits where there is a gulf between the information put out by government departments and the ability of those at whom it is directed to understand and utilise it.

Although language can be a source of communication problems of all areas in scientific activity, it is especially so in the social sciences. As a contribution towards clarifying some of the issues involved, I intend in this article to discuss ways in which social scientists use language, in both its natural and technical forms, and to describe some of the resultant communication problems that relate to the development of information services. It is important that such services should be matched to the structure of knowledge within the relevant disciplines so that they can contribute effectively to the creation of new knowledge. In order for this to be achieved, service providers must understand the language(s) of their users.

The view from outside

There is a long tradition of criticising the ways in which social scientists use language. We are all familiar with the sort of casual comments that are made: information providers complain that they cannot supply suitable services because of social scientists' continued use of vague or woolly terminology; non-specialists (including other scientists) complain about writers who cloak 'common-sense' observations in impenetrable jargon and there have even been several strong attacks from within the social science community. Some of these criticisms are justified. Others are not—especially when they are made for personal reasons. Unfortunately, many of the criticisms are based on a failure to understand the material in question and the context within which it is presented.

It is a commonly-held belief that, because the social sciences are concerned with the study of everyday behaviour, their methods and findings must be capable of being understood by any intelligent layman. This is one cause of the poor quality of much research on information use: it is conducted by people with little or no training in social research who feel that question-asking is a simple process and that the results can be made 'scientific' by applying a few statistical techniques. This is a rather naïve view of what is involved in sociological or psychological research and reflects an attitude that was attacked by Sorokin, among others, as long ago as the fifties.[6]

Similarly with language, where the argument goes: 'we are all experts on human behaviour, so there is no need to disguise it with mystifying terminology.' Such a view often tells us more about the narrow-mindedness of the critic than it does about the subject of his criticism. Indeed, the casual use of terms from sociology, psychology or economics by the uninitiated can give rise to the very same linguistic confusions which are complained of.

While it is easy to defend good linguistic practices and oppose bad ones, it is important to remember that discussions of how language is used raise complicated issues about which we still know very little. Language is an important element of social science theory and research and yet its role is often underplayed: it divides communities as well as uniting them and it can be both an aid and a barrier to effective communication. Until we know more about linguistic practices and their background we are in a poor position to understand the findings of research on users and we cannot be considered competent to provide them with effective services.

Communication research methods

Our failure to appreciate how language is used is, in part, a reflection of research methods in information science. Two main approaches have been used to study communication behaviour. One can be called the structuralist view. This tradition relies on an objectivist stance and treats communication as a series of discrete and quantifiable operations. Those carrying out such research have not always been social scientists and many have lacked an awareness of the variability of human behaviour. Into this category come most of the studies which have looked at the structures of communication: investigations of library usage or journal readership, studies of selected authors' or conference participants' backgrounds and so on. Some of this work provides us with useful data, but much is of doubtful value and falls into what Gellner has called the 'cargo cult' approach to research.[7] He suggests that the apparent success of natural scientists has been so great that they can hardly be considered as being members of the same species as the rest of us. Gellner's comparison is with those technologically-primitive cultures which, when suddenly brought into contact with the overwhelming wealth and superiority of another civilisation, make hysterical attempts to attain this alien wealth by means of short cuts. It is in a similar fashion that some information researchers try desperately to imitate the methods of natural scientists in the hope of magically transforming their own work into 'respectable' science.

The study of information use is one area of research where such beliefs are to be found but it is by no means the only one. There are other comparable areas in which 'user groups' are studied. For example, a recent study of male sexuality in the U.S.A. made sweeping generalisations on the basis of a few statistics and a questionnaire of which 119,000 copies were distributed, but only 7,000 returned.[8] Such research is treated lightly when it concerns sexual behaviour, but when information research is done badly (and it is not too difficult to find similar, if less extreme, cases) the results are taken seriously—and this on a topic where sophisticated questions can be asked without the same risk of attracting fantasied replies or causing embarrassment to respondents as is often the case in sex research!

The importance of quantification for structuralist research has meant that relatively little attention has been paid to the role of language. This is probably because language is not an easy subject for investigation through the use of survey and other 'objective' methods. Although studies of this type use techniques borrowed from sociology, the resultant work is not sociological.

The second research style takes an interactionist approach, owes much more to sociology and generally is concerned with the individual user's point of view. Relatively little information research has been carried out within this tradition. Reasons for this include the low ('unscientific') status of such research within the information profession and the consequent difficulty of obtaining funds for it. Ideally, a project would owe something to both positions, but few examples of such work exist: the best known studies probably being those of Blake[9] and Wilson[10]

Conflicts in style

We can now consider some of the issues which relate to social scientists' use of language. While doing so, it is important to remember the distinction between those linguistic features that are essential to, and an integral part of, the work of a discipline, and those practices which are not entirely necessary and can lead to confusion or inhibit communication in some other way. If most of my examples come from sociology, this is partly because it is my own discipline (and I am more familiar with its problems) and partly because it is the language of sociology which receives the most criticism.

An important feature of the social sciences is the role of theory. Sometimes this is indistinguishable from certain forms of philosophy—much work is carried out at a conceptual level and there is an emphasis on the analysis of words and their meanings. The importance of theoretical work is often ignored (or, at least, underplayed) by non-specialists as well as by those working in more 'applied' fields.

Nevertheless, good research in the social sciences cannot exist independently of theory. The same would probably apply in any other scientific discipline.

There is, unfortunately, a conflict between the need for (good) theoretical work and its inaccessibility to non-specialists. This can lead to problems. The findings of social science research need to be directed at a very wide range of readers: sponsors (including governments), journalists (and, through them the general public) and professionals in such diverse areas as social work, education and the law. In the case of certain research topics, for example race relations or crimes of violence, external forces may dictate a need to produce quick results. Yet, while most of the audience will probably be familiar with the subject matter of the work, it is unlikely that many will have the background to appreciate the theory. This leaves authors with a choice: they must either present their writing in specialist language and risk not getting the message across, or else water the material down to an everyday level and take the other risk that important aspects will be lost or that ideas may be taken out of context.

In highly topical research the need for fast results means that there is great pressure on researchers to produce material which can be consumed rapidly by interested parties. Social science research findings, by their nature, have a high verbal content. It follows that, if there is a need to produce something quickly, there may not be the time to create the best quality written product. This contrasts with the natural sciences where the stereotype is of a chemist or physicist carrying out mysterious experiments in his laboratory. It is accepted that not all his experiments will lead to important discoveries. Indeed, they may not be successful at all. And it is not taken for granted that we will all be able to understand such findings as do result. Social science research, on the other hand, is assumed to be open to the comprehension of all. A few writers have the ability to present their work to general audiences (R.D. Laing, J. K. Galbraith and H. J. Eysenck come to mind): these are exceptional people and their very ability to popularise carries with it the danger that they may obscure the work that has gone into carrying out the original research. There is a great difference between writing for a scientific audience and for a general one: the average reader of a popular work can have little idea of the amount of research that lies behind it.

A further danger of popularisation is that ideas may be removed from their contexts. Social science languages contain many words taken from everyday usage, but with specialised meanings. Such terms can easily be picked up by journalists and others who fail to appreciate their technical meanings and who may debase the terms by using them in mistaken contexts. This risk can, to some extent, be avoided if new terms are created to describe such everyday situations. This, however, leaves researchers open to criticism for inventing neologisms to describe phenomena which are already well-known. Specialist terms lose their value if they become incorporated into ordinary language.

To talk of 'social science language' can be misleading: there is really no such thing as the language of sociology or the language of economics. Because the social sciences tend to be perspective-, as well as discipline-based, each theoretical perspective has its own terminology. Thus, while the writings of a marxist or a symbolic interactionist are recognisable from the words they use, the work of one group may not be comprehensible to members of others and, for example, different terms may be used to describe what are apparently the same phenomena. This division by perspective is another reason for the seeming proliferation of terms. It is also a barrier to the standardisation of terminology: each perspective tries, to some extent, to subsume the others and, therefore, its supporters are unlikely to agree to recognise the language of an opposing team as having equal value to their own.

The language of the natural sciences has developed an image which suggests that it is value-free and has an almost clinical precision. Some social scientists, particularly those in the positivist tradition, have fallen for this image and feel that their language, too, should be cleaned of its emotive and evaluative connotations. But social behaviour cannot be presented in this way and those who try to give a contrary impression are making the same mistake as are the other followers of the scientific cargo cult.

Perhaps, it is the philosophers of science who are to blame for the existence of such attitudes. They may have done much harm by selecting physics as a 'typical' science, thereby encouraging physicists to see themselves as engaged in the most important branch of research. For, as Pippard points out, 'something of this false belief has rubbed off on social scientists, many of whom are rather too apt to examine their methodologies with an anxious glance over the shoulder at the physicists, instead of getting on with the job.'[11]

Types of language

Gould[12] has distinguished between three types of vocabulary which are to be found in sociology: the technical, the descriptive and the theoretical. These categories, which are not mutually exclusive, can usefully be applied to all the social sciences.

Technical vocabularies are the easiest to discuss. Every science depends on certain operations or techniques which are essential components of its practitioners' tool kits and which permit ease of communication. The social sciences also have their special methods, many of which are well-known. Examples are survey research, personality testing and model building. These techniques have their own vocabularies and an understanding of them is becoming increasingly important for readers, as well as authors, of research reports. The use of words borrowed from mathematics can give the impression that such work has a 'hardness' and objectivity that other research lacks: a gulf is thus created between the supporters of 'technical' research and those who subscribe to more theoretical approaches. This 'hardness' is, however, often a mirage.

The issue of descriptive language is rather more problematical. By 'descriptive' research is meant that work which is concerned with the study of social, economic or political institutions, although it need not necessarily attempt to explain them. These are the areas which affect daily life and for anyone studying them there is a ready-made vocabulary available. This is where the confusion may arise: a ready-made vocabulary can imply ready-made solutions. Because we are all familiar with certain terms, we feel that we should be competent to discuss the problems that surround the operations of the institutions to which they apply—even if these issues are complex.

Such assumptions can, however, prove false. We can see how easy it is for a term to develop a multiplicity of meanings by taking as common an example as that of 'library'. It can refer to a collection of documents, the room or building in which such a collection is housed, a study, a publisher's series, an agency for theatre or concert tickets, a set of programs or data bases and, no doubt, several other things. Nevertheless, the meaning of a question such as: "Which library are you using?" could probably be inferred from the context. This would not be so easy in a case where more complex ideas are involved. The term 'family', for instance, is used freely in everyday conversation but as a technical term it can relate to various types of kinship patterns, household units or sets of relationships. If we go on to consider more abstract terms, such as 'democracy' or 'alienation', we find that they have almost as many definitions as there are writers on these topics: entire research projects have been devoted to analysing the meanings of these terms.

If the proliferation of terms with multiple meanings causes irritation and confusion, the same applies to the converse situation: cases in which several terms identify the same concept.

New terms may be invented not only by authors who wish to preserve their work from contamination by meanings imputed from daily life but also for more aesthetic reasons. For example, the term 'bourgeoisification' was introduced by a team studying English social mobility to refer to the adoption of middle-class values by well-off members of the working class. They apparently decided it was a rather ugly term and changed it in their later publications to 'embourgeoisement', with its more cultured French air. It was the latter term which came into general use, even though its English connotation is rather different from the original French one. Variant terms can also apply to the same, or similar, concepts if they have been developed by members of opposing theory groups who do not read or readily understand one another's work.

The third type of vocabulary is the theoretical. This is by far the most difficult to control. Theorists need accurate language just as much as do technicians. Yet, the theoretical vocabularies of the social sciences are full of confusions. One reason for this is that there is no theory which is sufficiently comprehensive or over-arching to encompass all topics. Consequently, 'fuzzy' areas develop at the discipline boundaries where, unlike those in the physical sciences, no consensus exists. Also, very few theories are able to transcend cultural barriers, irrespective of how universally applicable they may appear to be. Some theories are not theories at all: merely sets of propositions which sometimes fail to add up. So, there are not only problems in search of theories but we also have theories in search of problems. Any behaviour, however irrational, can be justified if it is couched in sufficiently high-sounding language which few readers can untangle. Unfortunately, although such material probably represents only a small proportion of social science output, it is such work which gives the social sciences a name for hiding conventional concepts amongst impenetrable jargon. Gould has even gone so far as to suggest that the word 'theory' is the most frequently used and ill-defined in the social sciences.

The lack of any standard theoretical language for social scientists has led to the development of two schools of thought amongst philosophers of social science. One has seen this as a sign of the under-development (or relative backwardness) of a group of young sciences. This view received support from those members of the Vienna Circle who tried to create a Unified Science in the thirties: a plan which would have required a standard language to permit communication between members of different disciplines. The alternative viewpoint is to see the social sciences as being related to one another, but as having a separate form of development, and a different linguistic structure, from the natural sciences. Many information scientists have favoured the former approach—possibly because its adoption makes their own lives easier.

These comments on theoretical vocabularies might be seen as arguments in support of those who consider the social sciences as being relatively under-developed. This is not the intention: rather, it is to show that there is a variety of theories, some good and others bad, as well as a range of theoretical perspectives. All of these generate their own terminologies. We must accept that this type of conflict is a feature of the social sciences. It is a mistake for information specialists to think that they are doing social scientists a service by forcing them to standardise their language. What can appear to the layman to be excessive jargon may, in fact, be a form of expression that has been specifically created to suit the needs of a particular group. The design of effective information systems should take this into account and the views of users be incorporated before such enterprises can be successful.

Increasing precision

One current approach to easing communication within the social sciences has been demonstrated by the movement for conceptual and terminological analysis, which has generated several international projects (see, for example, Riggs[13]). The main issues are considered to be two-fold: clarification of concepts and ease of translation.

Attempts to increase the precision of language have generally been the preserve of conservatives. In recent times, such moves have been associated with the Popperian and Kuhnian schools. The arrival of mechanised information retrieval systems has given an undoubted impetus to this activity. However, even strong supporters of the relativist view of scientific development must acknowledge that the current state of information retrieval technology allows for little freedom of linguistic style. One major improvement in this respect has been the creation of *Sociology of Education Abstracts* which caters for a variety of theoretical perspectives.[14] But it is difficult to see this example developed on a large scale without a means of switching from one mode of language to another. And, for such switching to take place, some form of control is necessary.

One way of developing such control is by creating formal links between concepts, words and terms, all of which need to be distinguished with care.

Concepts and terms

A concept is a form of mental construct. If we again take the example of 'embourgeoisement', we find that although the term was first used about twenty years ago, the idea had been discussed for centuries—certainly during the Scottish Enlightenment and probably a good deal earlier. In more recent times, Marx was a major contributor to the debate. However, none of these writers had given a name to the concept. And it is the naming that presents the confusions (for the purposes of this discussion, the chicken-and-egg problem of how we can know we are referring to the same concept without having first accepted a common definition can be ignored).

A term is the name given to a concept in a specified context (otherwise it remains as a mere word): in the above case 'embourgeoisement'. One concept can have several names and the same name can, unfortunately, apply to a number of concepts. These problems can be reduced through the use of classifications and definitions.

Classification involves bringing ideas together. Thus, if I say that all football matches are boring, I am classifying football matches in a particular way. In biology there has been a belief (which is now questioned) that it is possible to devise schemes which provide for non-intersecting classes into which any individual can be placed. The same cannot be done in the social sciences where relationships between entities are so complex and variable that they can only be put in simple (and overlapping) categories. Most biological features are relatively fixed: the sudden appearance of a large growth on someone's nose is not usually an indication that that person is turning into a rhinoceros: it probably signifies the presence of a tumour.[15] On the other hand, an agitated crowd in a busy street could be due to the start of a revolution, the apprehension of a thief or housewives looting a supermarket because they object to price rises.

Definition, which normally involves the naming or labelling of concepts, presents particular problems, especially in sociology where there is an important, but in this context confusing, theoretical perspective which encourages the definition of 'situations' as well as of terms.

There is a question of style, too. It is common for social scientists to begin discussions by presenting their own definitions of the terms to be used. This gives many articles a certain tedious sameness. It also results in different writers using identical terms in ways that differ only slightly.

Translations

There is a need for translations in the social sciences, not just between national languages, but also between professional ones as in both cases the lack of mutual comprehension provides barriers to communication. In the case of national languages there are, however, two separate aspects to the problem. The first is that very few English-speaking social scientists have mastered a second language.[16] Consequently, material that is published in, say, French or German, can take a long time to have any impact on the English-speaking world. On the other hand (but, possibly, as a result of this), there is pressure on those whose native tongue is not English to publish in that language. This attitude is especially strong in the U.S.A. (see, for example, Garfield[17]) and puts researchers who are not fluent in English at a big disadvantage: their scientific competence is devalued in the face of insufficient linguistic proficiency and, as a result of this linguistic imperialism, they may have great difficulty in giving papers at major conferences or publishing in high-status journals. Such problems are of less consequence in those natural sciences in which the verbal content of reports is relatively small, though, even here, French scientists are worried about the visibility of their work. While their current motto may well be 'Publish (in English) or perish', there is a strong fear that papers published in either language will be ignored if the journal, itself, is French.[18]

If we accept that the need for translations exists, there is still the problem of creating them. The difficulties of converting material from one language to another are familiar to everybody and are an important feature of travellers' tales! Two approaches are available for carrying out this activity: it is possible to translate the words alone or else the ideas can be translated without necessarily adhering to the original style of wording. The former appears to be the simpler method, but it can lead to the type of error that makes for amusing newspaper 'fillers' during the silly season. It can also produce the turgid translations of scientific papers which successfully eliminate all the interest from the originals—and the literature of the social sciences can do without further infusions of dullness. The translation of ideas, which needs primarily to take account of the meaning of the material being translated, is the more effective and requires much more creative effort. Yet, however much we accept that there is a need for translations, they can only be carried out well if there is a sufficient development of glossaries of specialised terms and of thesauri. It is for this reason that the research on conceptual and terminological analysis, mentioned earlier, was initiated. Its aim is to improve communication in the social sciences by overcoming the problems of language. It is hoped that this can be accomplished by creating a data-bank which will generate dictionaries, thesauri, glossaries and an international encyclopaedia of social science concepts, as well as providing the basis for a document classification scheme.

The value of terminological control

These activities should produce several benefits, the most general of which is to make the research process more efficient. One way of doing so would be to improve the standard of writing by encouraging authors to develop clearer and more precise styles. In addition, the existence of term banks would allow individual authors to check how others have used specific terms before they set about creating their own definitions. The appreciation of the results of research could also be enhanced by making it easier for users to understand published output: something which might be achieved once means have been found of reducing linguistic and cultural barriers. Laymen, as well as specialists, could then, perhaps, make effective use of research findings. A final benefit to be derived from these projects should be the improvement of information storage and retrieval facilities for all: scientists, scholars and practitioners, as well as the public at large.[19] The existence of a movement with such aims is laudable, even if it succeeds in accomplishing only some of the objectives. However, its members could easily fall into the trap of providing a focus for the cargo cultists, with their mistaken analogies, while ignoring the most complex issues and limiting their work to the more easily codified theoretical perspectives. This, if it were to happen, would be unfortunate and might reduce the value of what could develop into a useful basis for a future communication system for the social sciences.

Is there an answer?

So far, I have discussed a variety of problems but, with the exception of the last reference, have made little attempt to supply solutions. Unfortunately, however, our present state of knowledge is such that it is more important to identify appropriate questions than to supply what may be half-baked solutions. In addition, there are certain 'problems' which are likely to remain insoluble for the time being: some linguistic features of the social sciences are an essential part of the structure of those disciplines and cannot be eliminated without causing damage. Thus, attempts to encourage authors to write simply and clearly are unlikely to be wholly successful. For example, social psychologists usually study aspects of everyday behaviour and are aware of the confusions that can arise from the use of ordinary language. For them, the creation of new terms undoubtedly satisfies certain social needs: not only as a means of distinguishing technical from conventional usages, but also as a way of conforming with the image a 'scientist' is expected to present. The audience has ideas as to the form that a piece of scientific writing should take, and is likely to give much greater credence to work meeting these expectations. So, a process of literary re-education would need to influence readers as well as writers of social science publications. Technical languages also serve other social needs—for instance, by providing a link through which members of a disciplinary group can identify with one another.

It can be seen, therefore, that language patterns are not necessarily all that they may appear to be at first sight. A casual observer might suggest that an immediate improvement in communication could be achieved by following the recommendations of C. Wright Mills: that every writer in the social sciences should first ensure that he thinks clearly and then present his ideas in as simple a form of language as his subject and his thoughts about it permit.[20] Indeed, these are admirable sentiments and we could all benefit by following them. But, attractive as this recipe may seem, it cannot provide an adequate solution to the problems which have been discussed here.

It is especially important in times of economic restraint that services of any sort are effective. This means that they must meet the needs of their users and that service suppliers should be in a position to appreciate what these needs are. Social science information services are still in their infancy, but adulthood is approaching rapidly. It is important that, by the time they reach maturity, adequate research has been carried out, for mistakes could prove costly.

Final comments

My intention in this article has been to demonstrate that language can be a barrier to communication and to suggest that the study of linguistic practices ought to receive a high priority as a research topic. Language should not be treated merely as a means of transmitting information, but should also be seen as problematic in itself. It is an unfortunate irony that, although many social scientists are interested in the study of communication, few seem keen on investigating the communication patterns of their peers. The first step towards overcoming this problem must be to encourage social scientists and information specialists to collaborate in the search for an effective system.

Perhaps Humpty Dumpty, with his power over language, should have the last word:

> 'Impenetrability! That's what *I* say!'
>
> 'Would you tell me, please,' said Alice, 'what that means?'
>
> 'Now you talk like a reasonable child,' said Humpty Dumpty, looking very much pleased. 'I meant by 'impenetrability' that we've had enough of that subject, and it would be just as well if you'd mention what you mean to do next, as I suppose you don't intend to stop here all the rest of your life.'
>
> 'That's a great deal to make one word mean,' Alice said in a thoughtful tone.
>
> 'When I make a word do a lot of work like that,' said Humpty Dumpty, 'I always pay it extra.'

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NRCd, word processors and the information industry

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Introduction

THE NATIONAL REPROGRAPHIC Centre for documentation was formed in 1967 to examine the value of microform systems to members of the library community. In the summer of 1979 the Centre installed a word processing system in order to see how useful this new technology might prove to be in similar environments. NRCd has investigated three applications which may prove to be valuable to special librarians: the relationship between word processors and other reprographic devices, notably photo-typesetting machines and COM recorders; the automation of certain housekeeping tasks and the mechanisation of information retrieval on a small scale.

NRCd and word processing

Some of the readers of this journal know that despite the generality of its title, the National Reprographic Centre for documentation has occupied itself for most of its existence with a study of the minutiae of micrographic technology. The research project out of which the Centre grew, initiated by the librarian of what is now The Hatfield Polytechnic and undertaken by Bernard Williams, the Centre's Director, was a study entitled 'Evaluation of microrecording techniques for information data storage and retrieval'. Implicit in that report and therefore in the use of the words 'reprographic' and 'documentation' were, perhaps (though the present author was not party to the choice of title), two assumptions; one, that a useful distinction could be made between the use of ironmongery in an information centre and the cerebral activities which distinguished the job of a librarian from that of, say, a racing car mechanic; two, that the library community, despite its propensity to read and the opportunities available to it for study, know so little about its tools that a whole new institution, albeit a small one, could devote its energies to the investigation of this one topic. In fact, an inspection of the literature of that time—the mid sixties—reveals that both vendors and commentators were sufficiently conscious of the benefits to be had from the mechanisation of library tasks and that, as with so many other kinds of capital investment, justification was a function of scale—what was done in the Library of Congress was likely to be different, not only quantitatively, from what was done in the library of the Association of Collectors of Decorated Beermats. This has led to a desire for 'automation on a shoestring', and the desire has been reinforced by the emergence during the period of which we write, of what Apple Corporation always describes in its literature as 'the personal computer system for the professional'. The word 'personal', we must suppose, relates to price and 'professional' to a capacity for tasks more demanding than Space Invaders. One of these tasks is that of text editing and formatting and record processing, hereinafter referred to as w/p.

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The sort of word processing machine the investigation of which NRCd in the Spring of 1979 decided, for reasons which we hope will shortly become apparent, to devote some time and resource, had derived from three origins. One was the punched paper tape driven automatic typewriter, the first of which is reported to have been introduced in the 1920's. The second was text editing software provided by mainframe vendors as a cosmetic to improve the presentation of d/p output. But most importantly, the third was the development of terminals sufficiently intelligent to permit data processing. distributed to the point of use, working in real-time, interactive mode, calling for large scale integrated circuits without which the present generation of w/p machines would be impossible to conceive.

Just how much automation a library needs seemed to us, from our earlier conversations about the installation of microfilm equipment, to be a function of these variables: the size of the database; the amount of activity, and the value attached by the parent to each hit. (We use the word 'database' loosely, not in the sense in which computer scientists or online buffs use the word, but as a convenient label for any one file, or library of files, sufficiently small as to permit it to be conveniently manipulated by sequential search or sort, whether in one pass or several. Thus it might be a catalogue or collection of abstracts or even a registry of correspondence; by 'activity', we mean the number of such manipulations required in a given unit of time by all the potential users of the library facility, whether serially or simultaneously).

NRCd justified its investment with the belief that the equipment would be beneficial in three ways: as an administrative tool; as an aid to its publishing activities and as a subject of investigation, in much the same sort of way that micrographic equipment has been studied throughout the previous decade. The first year of the system's life was taken up with two tasks; familiarisation with the particular model purchased, in order to ensure that when exploration began in earnest we would not be attempting tasks which, almost by definition, lay beyond the scope of the machine; and building a mini-database, a product directory, in which all other available machines were characterised so as to determine whether tasks being attempted on the NRCd machine might, or might not, be paralleled by other brands which our subscribers might be tempted to install.

(When I speak of 'subscribers', I refer, as many of the readers of this journal will, I suspect, already know, to the 800 or 900 members of the library and business communities here and abroad who already use the Centre's advisory, publications, educational and consultative facilities probably, one suspects, because of their interest in mirofilm technology. It is worth noting that this list has been suplemented in the period since the installation of the Wang machine by other interested parties—not necessarily paid-up NRCd subscribers).

Exploratory tasks

Word processing machines had evolved from the earliest punched paper tape driven models of the 1920's first as tools to mechanise the repetition of texts. Then there appeared, following the application of magnetic storage media, machines which permitted the modification of both content and format. Sub-routines, originally 'hard-wired', resident in the system in the form of an unalterable circuit, but more recently as overlays called down temporarily into core from some external source such as tape or disk, permitted a number of editing facilities, nowadays regarded as standard attributes of any word processor worthy of the name—insert, delete, replace, search, move and copy. Format control had been facilitated by the use of pulse-driven stepper motors, typically operating with horizontal increments of 1/120″ and vertical ones of 1/48″, associated with counting and logic elements which governed character space, line length, line space and page depth, so making possible centreing, emboldening, right margin justification, pagination, intricate tabulation and the multiple indentation of hierarchies of paragraphs. These three classes of job, then—repetition, editing and formatting—had become the expected function of w/p machines by the time that NRCd installed its WANG model WPS 25/II.

It seemed no part of our remit to have to describe and explain these conventional facilities to the library community. What did seem a useful task for NRCd to attempt was to investigate and then report the extent to which the automation of housekeeping tasks and of information retrieval could be undertaken on word processing machines—the sort of jobs that had been explored by 'leading-edge' practitioners a decade ago at least, and to which large central main-frames or local minis had been applied. Generally their designers had one of two aims in mind (1) to minimise the overhead required to maintain a given level of services or (2), more often, to improve the quality of service being provided without ruinous increases in the levels of human and cash resource required to do so.

Adequate literature exists describing automated library tasks for us not to have to repeat them here. Suffice to say that *any* task for which a typewriter had been used in the past and which was capable of being 'programmed' seemed suitable for investigation, at least at the outset. We quote 'programmed' because, of course, the majority of dedicated word processing machines are incapable of being manipulated in the same way that one would expect to manipulate a general-purpose computer of the same capacity. Indeed, the point has often been made that a word processor is no more that such a device whose programming has already been provided by the manufacturer for a limited number of functions.

What *we* mean when we use the word 'program' is that the job chosen for investigation can be analysed into a logical sequence of operations, each of which (or, on occasions, only some of which) can be made to benefit from those specific elements of automation listed in the vendor's w/p specification. Such jobs clearly include catalogues, indexes, abstracts, lists and bulletins in the origination and maintenance of which most special librarians spend a large part of their time.

Word processors for publishers

Before we go on to describe the experiments undertaken in these fields, however, a brief digression is called for. NRCd, like many another information bureau, is expected to disseminate what it discovers, and to that extent must function as a specialist publisher as well as a special library. In parallel with its study of information retrieval, therefore, it set out to examine the available interfaces between word processors and two important items of publishing equipment—computer-aided photo-typesetting machines (PTS) and computer-output-to-microfilm recorders (COM). Since both kinds of device require binary encoded data for input it did not seem unreasonable to us to expect that ways of connecting them to word processors would prove common to both.

Three possibilities were examined: direct online connections either local or remote (using voice-frequency lines) and two offline techniques, the first of which assumed that the output of the transmitter would be acceptable as the input to the receiver; the second assumed that it would not and that conversion to some more compatible medium would need to be effected (punched paper tape in the case of PTS and magnetic tape in the case of COM). Direct communication between compatible terminals by co-axial cable link could, we knew, be taken for granted in the case of WANG since that company was, at the time that we began our investigation, one of only two who supplied not only w/p but also PTS equipment (the other being A.M. International). Since then the best-known vendors of PTS equipment have launched w/p terminals or, one might say, editing terminals well capable of being used for word processing.

The more interesting possibility involved the connection through acoustic couplers or modems, via British Telecom's voice-frequency network, of the word processor to the photo-typesetter, assuming that line disciplines would be common to both. Should they not, several companies are, by now, supplying black boxes designed to accommodate the coding and framing conventions of the dozen or so most commonly found word processors to those of the half dozen best known PTS machines. However, a greater volume of text would need to be set than we at NRCd and those like us could provide for us to justify the capital investment required for an online, in-house system.

The more appealing arrangement would be to move the physical output of the word processor (probably diskette) offline to the COM machine or typesetter (union permitting). We would assume that typographical and formatting instructions would be injected at the far end. Unfortunately, as many readers will have discovered, w/p vendors have chosen for what must seem to them good commercial reasons, to format their diskettes in different proprietary ways. The European Computer Manufacturers Association (ECMA) has published a standard (ECMA 54; January 1982) but few suppliers conform.

A complete change of medium therefore commended itself. Most PTS systems are, or at any rate were when we began the investigation, capable of being driven by punched paper tape. Not surprisingly, perhaps, since the typesetting industry had used paper tape in one form or another since the earliest days of mechanisation a century ago. The WANG 25 will, as it happens, support a paper tape punch and software can be supplied which converts WANG's ASCII/WP encoding to the teletypesetting conventions demanded by virtually all PTS machines. NRCd conducted a brief trial with the assistance of the office services division of the Greater London Council who had acquired not only these ancillaries but also a photocomposing device capable of being driven by Wang output tape. Thus we were able without a great deal of effort to demonstrate to our own satisfaction (1) that w/p users could avoid the redundant rekeying of raw text due to be set and duplicated and (2) that the injection of typographical commands, at least of the simpler kinds, was a task which could reasonably be attempted in-house.

COM recorders by contrast are rarely if ever designed to be driven by paper tape. Generally, it has been assumed that they will receive data by line or via some magnetic storage medium. Magnetic tape as an offline medium commended itself, especially as industry-wide standards had long been established for data formatting and, even if they had not, many COM devices were supplied with sufficient intelligence at their front end for reformatting to be carried out there. Perversely enough, however, our word processor would not support a magnetic tape drive, not will many another. It was this deficiency which prompted us to begin to examine the possibilities inherent in communication with the Polytechnic's computers at Hatfield, eight miles away. As it turned out, our exploration of the library tasks, noted above, would have prompted the same course of action.

What we were to attempt has been called elsewhere 'mini-database management'. We had begun with what we took to be the not unreasonable assumption that many special libraries, like ourselves, were by their nature accustomed to handling texts generated in-house on typewriters, either direct or by transcription, by corporate authors. And it seemed equally reasonable to attempt to emulate *any* form of retrieval which such a library might attempt, by whatever means a word processor could provide, in order to minimise the amount of rekeying and restructuring of text which such retrieval might otherwise demand. Mainframe techniques, of which STAIRS and STATUS are perhaps the best known, existed for such retrieval. To what extent could the best word processors emulate such powerful techniques without incurring such high expenditures and systems overheads?

SEARCH facilities

We began our investigations with the well known fact that all word processors worthy of the name offer a SEARCH facility.

With a menu-based w/p system like our own WANG the operation is simple.

Key	"search"
Display	"search for what"
Key	character string
Key	"execute"

This example typifies the difference between a special-purpose computer, like a word processor, and a general-purpose computer such as are being used here and there in libraries for a variety of tasks including word processing. It demonstrates how much more easily operated systems are once prefabricated instruction sets have been provided. (It also goes some way to explaining why w/p equipment is so much more expensive, relatively, than a general purpose micro or mini of equivalent capacity and power.)

Wang and other w/p systems will also be supplied with SORT routines and some with SELECTIVE RETRIEVAL (which is in fact a special application of 'SEARCH', looking through a small number of labels rather than a large amount of free text). Before we describe how we at NRCd are using all three facilities in order to investigate mini-database management, a word on the fundamental concepts of logical processing by semi-conductor devices might be useful.

Electronic logic

Most information retrieval is based on a concept of matching: 'if (at such and such an address) there is a binary coded string equal to the string I am about to key in, then (do something).'

All the Boolean truth tables can be represented by combinations of electronic bistable switching elements. When we recall that the rate at which these elements are being switched is measured these days in MIPS (million instructions per second), it will be apparent that matching of the kind that is fundamental to all computer operations can readily be brought about by large-scale integrated circuits, despite the high number of operations (and therefore of bits) required to perform even the simplest of tasks. And so it is that the searching, sorting and conditional selection operations which form the base of all information processing are entirely possible within the constraints of a present-generation micro or mini-based word processor.

What then are its limitations?

Limitations of w/p software

In order to find out, we have tried to emulate some of the tasks with which libraries might be faced whether they are in industry, or in government, or in academic or scientific institutions; in particular, three tasks:

(1) The creation of a mini-database and the selective interrogation of it.
(2) A mechanisation of KWIC indexes and of the abstracting process.
(3) The application of 'glossary' to some housekeeping routines such as the creation and maintenance of small catalogues ('glossary' being WANG's word for a routine whereby a planned succession of keystrokes can be automated. Many advanced w/p systems have such routines.).

The file that we have built for selective interrogation is in fact a directory of word processing products collating information researched in as many sources as we have been able to identify and using techniques which we established for micrographic products from the foundation of the Centre. This file includes some hundred odd records each of some sixty odd fields and represents therefore a notional document length of 256 kilobytes, very near to the stated maximum file size of the Wang system 25/II.

The file has been structured in two ways to enable us to test the usefulness of both the SORT and the SELECT facilities.

Using 'SORT' for information retrieval

In the case of SORT we have used a blob-chart effect with the majority of characteristics definable as yes or no.

The limitations of Wang's sort package can be stated as follows:

(1) No file shall exceed one page.
(2) No page shall exceed 120 screenloads of text (= 1600 ch approx.).
(3) Each record end is defined by 'return' and shall not exceed 256 characters.

(4) Each field is defined by a tab or an indent or a centre. There shall be no more than 255 fields per record.
(5) Sorting can be in ascending or descending order of the collating sequence of 93 characters and is accurate to the first 25 characters.

'SORT' has also been used to invert the files created in our abstracting process and to produce a KWIC index of w/p references taken from the current literature and used partly as an in-house tool, partly to supplement the commercial databases which are being increasingly used by members of the knowledge industry. NRCd processes about 100 abstracts per issue of *Reprographics Quarterly* indexing them, cumulating them annually and publishing a separate index every 1000 abstracts—not many by some standards but enough to experiment with. Journals are scanned intellectually, of course, and the keywords are highlighted, an accession number assigned and an abstract appended in manuscript.

The whole of this is keyed, as if by typewriter in a manual system, except that (a) flags (e.g. *, $, # and so forth) are entered to assist subsequent searching and reformatting and so (b) a file is created for subsequent manipulation. This file is processed for indexing by applying a 'glossary' which will automatically search out the data and reshape them into the format required for sorting. The application of the SORT programme will then obviously convert a list of subjects or names by accession number into one of number by subject or name.

Wang's word processor will sort a screenful of records in about 3 seconds, a hundred records in 5-6 seconds and a thousand in 25–27 seconds. This pace is tolerable but will tend to degradation, taking up so much processor time that it inhibits perceptibly the rate at which other terminals can carry out normal text editing jobs. This irritates word processing operators who have come to expect virtually instantaneous response from screen and disc. This disadvantage is, as many well be imagined, even truer of the 'SELECT' instruction set, which we use to interrogate the product directory (as an alternative to the 'blob chart' SORT described above, when data cannot easily be made to conform to a fixed-field, yes/no format).

Using 'SELECT'

Selection in WANG requires that:

(1) each record consists of:
    (a) a specification
    (b) the record
    (c) an end-of-record mark, '!!'
(2) Each descriptor must be enclosed in brackets and may not exceed 20 characters. Any characters may be used except '='.
(3) Variable will follow each descriptor and can be of any length and can consist of any characters except '?' and '*'.
(4) Lower case will find both lower and upper case entries but those in u/c will find only u/c.

(5) '?' represents any character and '*' represents any word, thus permitting truncation.

Assuming that a file has been properly set up in this way then WANG permits the following six tests to be applied.

(1) IF (descriptor = variable)
(2) WHETHER (descriptor = this variable OR that)
(3) WHETHER (descriptor = this variable AND that)
(4) WHETHER (this descriptor OR that = variable)
(5) IF (descriptor NOT = variable)
(6) Any combinations of these

Of course this experimental mini-database presumes a certain amount of structuring before the files are set up, otherwise the routines will not work. But clearly, certain kinds of information retrieval cannot presume that the files will have been structured in any particular way at the time they were generated and before they were stored. If, therefore, free text in the shape of reports, minutes, proposals, surveys and in-house documents of a similar kind are stored without keyword indexes they can still be searched for relevance but only by a sequential string search.

Retrieval of this kind is better than nothing but may be too slow in practice. Some systems are available with both good w/p software and memory structures but not the Wang 25. Since the investigation began, however, a few manufacturers have begun to offer w/p systems, or to be more precise small general systems with excellent w/p facilities, in which file indexing software makes the searching of free text a simpler, faster operation than used to be the case. Datapoint, for example, offer AIM (Associative Indexing Method) and Burroughs offers its OFIS file management facility. Wang themselves offer ALLIANCE in which all documents can be indexed by *all* words which appear in the text and which automatically updates the indexes when editing is done—a feature which demands surprisingly little main memory and searching time. Many libraries may find it hard to justify the capital required for such general systems but a corporate investment in such could provide the information centre with a terminal which will serve as a powerful tool both for word processing and for information retrieval.

However, Wang 25 was equipped with no such feature and therefore we have looked at the possibilities of using our word processor as an intelligent, remote terminal of one of the Polytechnic's mainframes—a DEC 10/91. Once the additional hardware has been commissioned, however, the word processor will be entirely suitable, we believe, not only for conventional administrative and housekeeping tasks and to make us more effective in our role as small publishers, but also enable us to create and/or interrogate selectively the three important kinds of store needed by us and many, many other examples of small but specialised information centres:

(a) Small local stores generated inhouse and filed in w/p as a consequence of our text editing activities.
(b) Corporate databases requiring more disc space and better management and therefore the facilities of a mainframe.
(c) Even larger national and international databases which otherwise would need separate terminals.

Conclusions

It may appear from this account of the past eighteen months' work that NRCd's word processor, relatively powerful though it may be, is hardly adequate at all for the tasks we set ourselves but that would be a false impression which we have no wish to leave behind.

Indeed, we have concluded that in the following circumstances word processing systems such as our own can be valuable without significant modification or enhancement:

—In information units acting as special publishers when adequate volumes of text will eventually be reproduced by some reprographic system or other.

—In small information centres where some typing aids are needed and files are not so large as to exceed typical w/p memory capacity and funds are not available, or justifiable, for more than one kind of hardware.

—In large libraries and information centres where bigger computers are available for storage and database management but where w/p can be justified as intelligent data entry terminals and output editors.

Reflections on word processing: the experience of a small medical library

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The Philips word processor has been chosen by the Charing Cross Hospital Medical School Library because of its ability to perform tasks, particularly the catalogue cards, and its ease of use. Its characteristic features are given and details are included of the type of equipment available. Emphasis is placed on the comparative simplicity of operation, good visual display unit and printout facilities.

Specific applications at Charing Cross are identified, describing use of the various facilities. The merge process is explained showing how the system could be set up to send out personalised overdue letters. The establishing of a catalogue card system is described. A number of projects 'in process' are outlined. These include the establishing of an order file, maintenance and monitoring of statistics for on-going and short term purposes.

The value of using somebody else's equipment before purchasing is stressed and the point made that as technology isn't likely to remain static it is impossible to wait for the definitive machine.

Finally, ideas are given as to ways in which the machine may be used by members of a parent body to maximize use.

Introduction

THE AGE OF the 'chip' has arrived at Charing Cross Hospital Medical School Library. The doubtful first stage is over and the challenge has begun with the installation of a Philips word processor. This exciting acquisition finally joined our team after eighteen months of careful selection and regular experimentation using a colleague's machine—a most valuable experience.

The field of data and word processing is changing dramatically even the experts admit that it is difficult to keep up-to-date. When we began looking at machines in 1979 the situation was quite different from the one which presents itself today. This article outlines some of the considerations and indicates some of the applications which we have been developing.

A word processor came under consideration as an interim measure to enable efficient production of catalogue cards. It was obvious then that automation would develop and that automated systems would become essential, the technology was changing, the price reducing, but the time had not then arrived to consider more sophisticated and comprehensive systems. Our 'interim measure' has now become an integrated part of the Library system. All the Library staff (eight) use it and we have two fully trained operators.

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Choice and characteristics of the machine

The Philips word processor was chosen (from a formidable number of constantly changing contenders) for two reasons; firstly its technical ability to perform the specific functions we required and secondly its ease of use.

The Philips has a standard QWERTY keyboard with a number of additional function keys. The operator is able to begin typing into the memory without needing either to open a file on the disc (using a routine procedure) or to make a series of format selections. Indeed having typed the data she needs only to depress function key 'OPEN' before typing the name of the document and its page number. This, we found, was fairly unusual. Other procedures are equally straight forward. Files are set up as pages and although this is not particularly helpful for catalogue cards it is a simple method for allowing easy access and handling of files. The information processing, sorting and searching are all impressively achieved. Text editing, an important function, follows the straight forward pattern. Words, lines, sentences and paragraphs may all be manipulated with ease. The highlighting facility outlines data to be edited providing a useful check before the execution of such operations. Data transfer from the memory to the screen is quick. Storage is on 'floppy disc' and, using two disc drives holds 400,000 characters. Any width of line up to 250 characters may be selected and continuous column by column scrolling is possible.

The Philips machine has both 'locate' and 'sort' facilities which are used for alphabetising, searching and retrieval. It is also capable of drawing boxes suitable for flow charting. There is a 'maths' facility which is used for statistical work and a practical application of this will be described.

The visual display unit, showing about 30 lines including a couple of machine response lines, is another unusual feature. Many word processors have only one or two lines; others may have several taken up with machine responses. A good sized screen allows the operator to view the layout without printing a copy and is particularly useful when editing or re-arranging text. The green lettering is clear and the contrast may be easily altered to cater for individual operator preferences and differing lighting conditions.

Printing is achieved using a bi-directional Qume printer with a standard daisy wheel. These may be easily removed to allow variation of type faces. The standard of type is suitable for letters, reports and catalogue cards. A wide printer is available and recommended for use with a 250 character wide page. A hopper allows single sheets of paper to be fed automatically into the printer and a tractor feed facilitates continuous stationery, including continuous catalogue cards. Print out can be made directly onto stencil (useful for standard forms or an accessions list) or up to eight carbon copies may be produced. An efficient soundproofing hood is available for the printer which allows the word processor to be cited in a general office environment and enables the operator to concentrate on working on a second document while printing the first.

Applications in the library

General applications

The word processor is naturally of great value in preparing documents of any nature which may need editing. This paper for example will have been altered perhaps half a dozen times before appearing in its finished form. Until such time as the library staff are able to set up the machine for its constant use it is being made available to other staff in the Hospital and Medical School who have arranged for their operators to attend the training course. Consumables may be purchased through the Library. It has already been used to produce a safety policy booklet and a number of papers have been prepared for publication. An interesting project has been the production of an in-house looseleaf telephone directory. The data can be input under departments and from this an alphabetical sequence of personnel is being produced automatically. The looseleaf binding enables pages to be updated as required, indeed it is being found that the problem of revision will be made considerably easier.

Returning to library applications, job descriptions, policy documents and manuals are all being stored on floppy disc. In addition minutes and reports are added as they are written The Library Guide needs updating most years, but it will never again need retyping in full. Staff details, overdue charges and publication date can all be changed with the minimum of effort: even a logo could be stored, updated or superseded with relative ease. Charing Cross has several affiliated libraries for which we provide some services. Joint library guides describing the individual library's services, and those available from the main library are produced. This is done by duplicating the information relating to the main library onto the new guide, re-arranging the text in the appropriate way and adding the new information concerning the individual library. This has obvious applications for libraries with branch and regional responsibilities.

Other library publications may now be kept up to date. Our special collections of historical texts, reference textbooks, audio-visual materials and journals holdings are all being stored on disc and updated at regular intervals. The updating facility has provided us with an opportunity to approach academic staff for the preparation of reading lists. We now offer to hold lists on disc and update them prior to the appropriate module, giving library staff the bonus opportunity to assemble items for restricted access. Our own course, run annually in the library, has a number of associated handouts which we have included on disc.

Personalised letters

The 'merge' facility which allows two pages of text to be combined is applied to a number of routine operations particularly where a standard letter is used. The system is first set up with one page containing the letter. Block codes are identified individually at the points where variable information may be required.

For example:

Block code (a) standing for the date of the letter
Block code (b) the name of the recipient
Block code (c) his address
Block code (d) would follow Dear ... in a letter
Block code (e) would contain the individual information perhaps relating to an overdue book.

Note: The position of these variables may be altered as required.

A second 'page' of the variable data would then be established. Using the 250 character wide page blocks of information would be set up in columns across the page. Each column would represent one of the variables identified by block codes on the letter already prepared. When complete the two pages are run together and the personalized letters are produced. At present we use these for very overdue items and circular letters requiring a high 'response' rate.

Catalogue cards

The Library undertook the production of catalogue cards using the South East Thames Regional Health Authority Library Services's word processor for some time. This application was an important priority influencing the choice of machine. The South East Thames Regional cataloguing co-operative and the Chelsea College Library catalogue card production both provided invaluable prototypes from which to develop our own system. We required a shelf list card (showing tracings), an author card, subject cards and added entries, none of which should show tracings but each include the relevant individual heading over the main unit entry. In addition we propose to use the information to produce an accessions list.

The first stage in setting up the system involved developing a format corresponding to the finalized form of a catalogue card. Each section of information which might be required to be searched or moved had to be analyzed. For example the date of publication would be required on the accessions list but not the details of the place of publication. The date must therefore be coded to enable it to be used in isolation and to be moved to a different position, in this case following directly after the author statement.

The second part of the system required the establishing of the data bank from which the cards would be printed out. The pages (each 250 characters wide) were therefore set up in columns across the page. The columns represent the relevant fields; classification number, author, title, subject headings etc. There is no restriction of the size of these fields except physical limitations of the card. Data is entered and, as the word processor is page orientated, a page number is allocated to the record. This is transferred to the printed shelf list card to enable the item to be recalled. Subject headings for bibliographies and the accessions list are added at this stage. The locate facility allows us to search the data base under a given heading and enables the establishment of a number of subject bibliographies. When a page of data is complete cards are run off automatically.

Statistics

A number of statistical applications have been developed. The line centering ability and the vertical line facility means that tables and flow charts may be set up easily. A table that is regularly used may be drawn and stored to be recalled as required.

Photocopies are charged to departments and it has proved very useful to set up a table showing how many copies each department has made in a month. Using the maths programme figures are produced to show the total number of photocopies made by all departments in any one month and those of any one department in any specified number of months. The Library is also monitoring the number of books bought in a particular price range and valuing books bought on approval against those returned to the bookseller.

A detailed account of Library expenditure is maintained and updated monthly, giving very accurate information for the Librarian to work with during these difficult economic conditions.

The future

The Library still has a number of applications which it has not yet had time to establish. The order file is in process of being added. From this it is hoped to chase orders which have not been received and keep track of those items which are sent out on approval or away for a binding process. An up-to-date list of titles on order and in process can be provided for the information of the enquiry desk staff.

Detailed statistics of inter-library loans are at present maintained on card showing journal titles requested and the reader requesting them. This is another application which has to be considered. The word processor is capable of providing information retrieval and applications may be found for it by the Reader's Advisor.

Far from reducing the work load we find that our word processor gives the opportunity to do much more than we would normally have time to do particularly with statistical analysis. Additionally it produces a much better response rate to standard letters. Technology is always changing and new machines will always be available. It is important therefore to start somewhere. We are gaining as much experience as possible using the machine we have at present. We are offering time to other members of the institution to ensure that the equipment is used to its maximum and to allow others the opportunity to experiment as we did.

ACKNOWLEDGEMENT

We should like to acknowledge the assistance of Charles White & Son, 6 City Road, London, E.C.1. for their co-operation in developing the catalogue card programme.

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LETTER TO THE EDITOR

THE ELECTRONIC FUTURE

With regard to Professor Stonier's Aslib Conference paper, 'The Electronic future' (*Aslib Proceedings*, 34(2) 1982), I would like to make the following criticisms. Firstly, with regard to two consequences he sees following from the 'new communicative society'.

(a) War is 'rapidly disappearing from the scene'. Evidence from the communicative society *par excellence*—the U.S.A.—would seem to suggest otherwise (e.g. the Vietnam War, the fierce escalation of the arms race). Moreover, it should be remembered that most of the new technology is actually developed in a military context by these communicative societies.

(b) '. . . the political systems tend to democratise.' Orwell, we are told, got it wrong: 'television was not a device whereby big brother could spy on the people'. Orwell, though, speaks of 'telescreens'; these are altogether different, able to both receive and transmit simultaneously. They are thus more akin to surveillance cameras, which, of course, do exist. Stonier goes on to say that television is 'a device whereby the citizens can . . . spy on their leaders', ignoring all the media studies that suggest otherwise. Even the 'information leakage' he speaks about is carefully stage-managed by the government lobby system of journalism.

As to why communicative societies tend to democratise, Stonier cites two factors: firstly, the new technology makes information systems leakier. Here he gives the example of Iran and the Shah's attempted clampdown on communications. Unfortunately, the Shah forgot the tape-recorders, which relayed the Ayatollah's speeches. This is undisputed: the Shah was so paranoid he banned 'Hamlet' and 'Macbeth' because they showed regicide. But the point is, the information was not simply rarified electronic pulses, it was the product of particular group interests in reaction to the Shah's 'White Revolution'. Thus the Ayatollah's recordings were more of an information jet—controlled and directed—than a leak. The tape-recorders prove insignificant; more relevant is the socio-cultural context: the entrenched Islamic tradition and the sanctity in which it was held, which gave the Mullahs their immunity; they, after all, worked the tape-recorders. In other words, this information worked whereas other information would not. (Incidentally, it is debatable whether 'the good Ayatollah's' Iran *is* more democratic.)

The second factor in democratisation is that the information operatives become the dominant form of labour. In 'advanced cultural systems', he writes, 'it takes about 2 per cent of the labour force to feed the rest'. This contentious figure omits the fact that we import many of our requirements from the labour-intensive Third World. I don't want to indulge in futurology, but it is worth pointing out that such developments as single cell protein (cited by Stonier) will increase the advanced nations' independence, as will the switching from raw materials like copper to fibre optics in telecommunications. All this is to the Third World's detriment, undermining their most valuable resource: labour; and as the new electronics industries are capital intensive and rely on expertise, transfer seems less likely. Stonier thinks that the advanced societies will provide the resources, but it is hard to see why this is any more likely than, say, giving over the vast surpluses of food to the starving at present. Orientation to profit rather than need militates against distribution.

This brings me to a criticism of two key, though loosely used, terms in Stonier's paper.

(a) *Democratisation.* When, for example, he speaks of the U.S.S.R. democratising, does he envisage a sort of democratic socialism (e.g. as of the Prague Spring) or does he see democracy as simply synonymous with a capitalist free market economy (organised for profit rather than need)? If the former, then there will still be the ideological tug over developing countries (as the West supported the Shah, the Russians Afganistan). If the latter (free market economy), there is still the problem of competition for the same markets. In which case needs will again suffer.

(b) *Information.* The information operatives will include large numbers involved in advertising, where being 'informative' has very suspect overtones (especially when it comes to competing markets: witness the harm done by promoting powdered baby-milk in Developing countries). Moreover, when Stonier quotes the forecast that by the 1990s, 'the average family will spend as much on the home information systems as it does on the family car', he is surely wrong to envisage this in terms of 'Prestel-type systems'. On present viewing trends, it is more likely that a greater part of the money will go on the successors of 'space-invaders'—especially as leisure industries mushroom with declining employment. So, the information operatives include not just the glamorous executives (cf. p.137) but those specialising in misinformation and non-information.

In sum, Stonier's electronic future is based on very shaky foundations. Yet it stands precisely because it is vague, uncontaminated by the realities of the socio-political world (market forces, the media, advertising, etc.). By screening out the confounding socio-cultural variables, the information revolution appears as a historical force about to usher in the golden age. But such technological determinism does not follow. New technology does not necessarily augur socio-cultural change; this depends on existing constraints. For example, Hero of Alexandria built a steam engine in the first century A.D., but more as a toy. In a society based on abundant slave labour no extension of human musculature was envisaged, or desired. Steam power was only realised centuries later, in a society that had accumulated the necessary capital (mostly from the slave trade, in fact) in a social class with a vested interest in promoting any innovation that increased its control.

Technological development thus depends on the society in which it is found, whether enabling or restrictive. Where the two are divorced and information is treated as an objective resource, unsullied by its social context, disaster can only follow. Just so, the example of the deep plough mentioned by Stonier, which was so important in our own pre-Norman agricultural revolution, was often disastrously applied in tropical countries, where a thin topsoil was destroyed by underlying acid.

In conclusion, *contra* his reference to Emanuel (sic) Kant's dictum, his theory does not relate to practice: information is seen in the abstract, not as something concretely situated. Yet any attempt to map the future must start from the existing landscape.

David Rudd
Assistant Librarian,
Hull College of Higher Education

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by
Blaise Cronin

This stimulating and comprehensive review discusses the role of graphics in the promotion of library services, and investigates the need for various support facilities in graphics production. The experiences of agencies which exert a strong influence on library graphics in the United States, Australia, Denmark, Sweden, Holland and West Germany are analysed in detail, and the report concludes by proposing a number of models for such support in the United Kingdom. Examples of innovative graphic design for libraries from a number of countries are included in this report.

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IT82: a polytechnic response—opening remarks

Neil McLean

Head of library services, Polytechnic of
Central London

Opening address presented at the COPOL seminar 'IT82: a polytechnic response' at the Polytechnic of Central London, 1 July 1982

INFORMATION TECHNOLOGY as a term is now firmly established in the minds of not only professional groups and the commercial and industrial world but in the public mind. This process has been hastened by the enormous boost to publicity which has resulted from the emerging IT82 campaign. The diversity of the campaign is itself bewildering and is an indication of the pervasiveness of the new technology upon society as a whole. The term 'information technology', inadequate as it may be, cannot be ignored and librarians face the challenge of translating it into meaningful goals for their respective institutions.

Librarians in general were reasonably quick to see the potential of computers for their housekeeping operations and can now claim fifteen to twenty years of fairly solid experience in this field. So technology as such is not a particular problem although it is acknowledged that there is still some way to go in perfecting existing housekeeping systems. But when 'information' was combined with 'technology' the emphasis switched to an area of much more fundamental importance to librarians. It is gradually being perceived that concepts of information have to be reviewed and indeed revised. The traditional monopoly on certain information services is being challenged and this has elicited a wide-ranging response over the last five years. The key to the debate has been the role of the librarian in the age of information technology and as to be expected there has been a wide spectrum of opinion. On the one hand there is the doom-and-gloom view that librarians will be redundant in ten years or at least relegated to an archival function. This tends to be exaggerated and is over-optimistic about the ability of human beings to adopt technological change for their own particular purposes. On the other hand the traditionalists often retaliate with a remarkably bland approach which underestimates the pace of change and borders on sheer complacency.

This debate on the role of the librarian in information technology has tended to become somewhat introspective and concentrates largely on the anticipated rate of technological change. To extend the debate there are a number of issues mostly relating to our own concepts of service that need reassessment. For librarians working in polytechnics there is an urgent need to look at the educational process and the

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likely effects of information technology on teaching methods. This is of course asking quite a lot because librarians and perhaps the teaching staff have not been particularly good at analysing the process as practised in polytechnics. To the outside observer this may seem somewhat ironic given that polytechnics were supposed to place greater emphasis on teaching than universities. To the extent that there is a greater emphasis on contact hours this is undoubtedly true, but the actual way in which these contact hours are used receives little concentrated attention.

In general terms there is tremendous diversity both in terms of method and quality of teaching at the undergraduate level. Being new institutions there has been an opportunity to innovate under the watchful eye of the CNAA but this has brought a greater diversity in course content rather than any substantial change in the way the subject is actually taught. The fact that polytechnics were often formed out of the amalgamation of smaller monotechnic institutions and even further education colleges has meant that there often is a substantial residue of extremely conventional teaching which is based on the chalk-and-talk-straight-from-the-text-book approach. At the research level there has been remarkable growth which has defied some of the original concepts that saw the institutions as being primarily teaching institutions. What is now more evident is that research cannot be divorced from good teaching practice in most subject fields particularly science and technology. This has meant that libraries have been coping with small but concentrated demands for up-to-date information which is mostly outside the scope of the actual collections within the library. But in the main, librarians in polytechnics have responded fairly positively to these demands over a decade of rapid growth in terms of building conventional book stocks of respectable proportions. They were fortunate in being able to rely on the British Lending Library to supply the bulk of periodical articles associated with research needs.

The advent, however, of powerful online computers which could accommodate large numbers of users and a proliferation of microcomputers within teaching departments means that traditional teaching methods are now in a state of flux and librarians would be wise to examine this process very carefully to assess their own response. This process is still dominated in most institutions by an alliance between the computer centres and computer science teaching departments where they happen to exist. This has produced a high level response in these particular areas. In some respects however it may be inhibiting developments elsewhere in teaching departments simply because the dominance of 'pure' computer expertise is often too narrow to perceive the more modest requirements within other teaching areas. As a result there has been a secondary explosion of microcomputers in teaching departments, and at this stage there is a considerable amount of experimental work in progress as individual members of staff, mostly with little or no previous computer experience, seek to find ways of adapting the new technology to their own teaching programme. It is generally completely uncoordinated activity and is often deplored at the policy making level as it appears to be a wasteful deployment of diminishing resources. But it may be a small price for pioneering initiatives. Unlike previous computer technology, which tended to dominate the users requirements, there is now the opportunity for increased applications for particular teaching need and this phase may continue for at least the next five years. During this time however traditional methods will continue to dominate in many subject areas.

Librarians will have to decide quite soon on the nature of their response to these changes and there are a number of factors to be considered which involve a rethink of traditional service goals. At the most basic level there is a need to reassess our own understanding of information provision. In most polytechnic libraries concepts of information provision are still relatively unsophisticated compared with those developed within special libraries. Book and periodical provision is a basic trade and information mostly relates to how these items can be obtained. With the advent of online bibliographical data bases the potential for this particular aspect has been extended considerably. It is particularly important where currency of information is the key, for example in the research area. But there is nothing new about this type of activity in relation to the teaching process as we know it now; it merely is a quicker more efficient way of carrying out traditional bibliographical activity.

But what is less clear is whether librarians will have a role in processing information either in response to specific enquiries or in response to teaching requirements. Some polytechnic libraries in their original development plans made clear reference to the role of the libraries in either 'processing' or 'distilling' information. This assumed an extremely active role and a high level of subject expertise in evaluating knowledge. There were two major influences on this thinking coming from entirely different sources. The scholar librarian in the university context has a long history and the idea of subject librarians in polytechnics owes much to this particular source. On the other hand some of the original polytechnic libarians had considerable experience in industrial and commercial libraries and it was from this sector that the idea of 'distilling' information for clients was introduced. There is no doubt it provided an active concept of information provision but there are only isolated examples in polytechnic libraries of librarians practising in this fashion. The increasing ability to manipulate information through computer processing may give new impetus to librarians exploring an extension of their role in this direction. In particular the availability of microcomputing power at relatively low cost should prompt librarians to once again consider the feasibility of creating databases geared to specific groups of users. There have been attempts by individual librarians in polytechnic libraries to create local databases by manual means, but they founder because the time involved in maintaining them and in disseminating the information has been excessive. Librarians will also have to make a conscious decision on whether the library is to become a centre for computer assisted learning. There are two principal means of achieving this objective. Firstly by providing terminals either online to central computing facilities or as stand alone microcomputers. This is a relatively easy step to take and involves little active intervention by librarians. But it would help to focus attention on the library as a natural centre of learning in the computer age. The second means of achieving the objective would require active collaboration between librarians and teaching staff in preparing and providing software packages as part of the computer assisted learning programme. This is a much more complex field as there is a shortage of expertise on both sides but the time may be ripe for stronger initiatives by librarians in this area.

Given that information technology is primarily concerned with information transfer it seems self evident that librarians should be involved in varying ways in the transfer of the information. But what is far less clear is whether librarians should be involved in explaining the potential for information transfer within the information technology revolution. By this I mean having an educative role in explaining to students the potential for information handling. The record so far in user education within polytechnic libraries is mixed. It has been more successful in science and technology and even in these areas it has been very much dependent on personal relationships being developed between a few librarians and individual lecturers. There are many instances where small projects to deal with searching for information have been built in to the curriculum but they have remained peripheral to the mainstream of the educational process. The optimism of a decade ago has waned considerably in terms of the claims for user education and there are signs of retrenchment in polytechnic libraries as resources are squeezed.

But librarians seem as well placed to take up a new role in creating an awareness of information handling through new technology. This would not be merely a means of demonstrating information retrieval through bibliographical sources but the ability to access actual data and manipulate it for specific purposes. With the advent of full text online retrieval services the educational benefits could be dramatically extended and librarians could if they so wish offer whole programmes in this area. Co-operation and partnership in the teaching process depends on a sense of equality and librarians in the main have simply not achieved this equality in the eyes of teaching staff as yet. There are those who will maintain as they did with user education, that librarians are not there to teach but it does seem imperative that they at least examine these new opportunities or risk further parts of the information cycle being removed from their hands.

It is important that we address ourselves to these questions in the context of general developments within our respective polytechnics. Initiative is essential to all new developments, and I take the view that librarians rather than feeling threatened have a tremendous opportunity to be partners in the teaching process in the way that has not been open previously. To react positively to the challenge will of course have implications for resource allocation and for the way we organise our staffing structures. But at the moment we tend to treat the problems in reverse order. A great deal of time and energy is spent in cobbling together a minute proportion of total library budgets to be spent on online retrieval services and even this is open to attack when faced with the competing demands for conventional materials. Equally the problem of whether staff and students should or should not pay for these services has become a thorny question and the result has been a most unsatisfactory set of arrangements which are geared to strict monetary goals rather than service goals. Until we tackle the broader service goals there will be no satisfactory solution to these more practical questions. I am not suggesting an open-ended commitment but a reallocation of resources does depend on a commitment to a particular set of objectives. This is not to say that there will be sudden sweeping developments. Given that the changes in teaching methods as a result of computer developments will be faltering and piecemeal, the library response will be geared accordingly and the rate of change in various subject areas will differ a great deal.

Lancaster maintains that two essential factors in measuring library effectiveness are accessibility and 'exposure' and the degree to which these are maximised in the interests of the users.[1] If polytechnic libraries are to act as information centres in the information technology age we must rethink how we can become part of the mainstream in our respective institutions. 'Accessibility' and 'exposure' are terms that imply risk and a certain degree of vulnerability but they are the inescapable objectives by which we should measure the quality of our own response.

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Information technology in polytechnics

Yakup Paker

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Paper presented at the COPOL seminar 'IT82: a polytechnic response' at the Polytechnic of Central London, 1 July 1982

1. Introduction

INFORMATION TECHNOLOGY, a recently coined term, remains susceptible to varying interpretations by different people. The intention, clearly, is to emphasize the emergence of a new technological era which manifests itself in so many unrelated disciplines and activities. The French have the tendency of inventing new words for emergent concepts such as 'informatique' which is computer science and technology, applications and wider social and economic implications[1]. More recently, they have introduced the term 'télématique' to describe the convergence of computers and communications and 'burotique' for office automation. The English language seems to have a resistance to invented words. For example, informatics (the equivalent of informatique) has found only limited acceptance. The Council for National Academic Awards (CNAA) has a committee entitled 'Computing and Informatics' where the word computing has been retained, presumably, to help those who wonder at the meaning of informatics. The suggested equivalent of 'télématique' by some American authors 'teleputer' has not caught on, therefore, we have Information Technology instead.

In this paper, a brief overview to information technology will be presented by considering separately the aspects of information and technology. Then the implications for education in a Polytechnic environment will be discussed.

2. Information

This is a difficult concept to encapsulate in a single definition. We know that information is all pervasive for individual and collective human activities and modern society could not exist without it. Information can be communicated by speech, text and visual means. Once a certain manifestation of information exists, its transmission becomes possible through various means such as acoustic waves, electric pulses and so on. Note here the close link between the concepts of information and communication. Information, in fact, could be interpreted as the means for us to recognize facts and situations that already exist. Thus information is also closely related to knowledge. Information, in a sense, gives us access to accumulated knowledge.

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In pre-book times, accumulated knowledge and experiences were transmitted by immediate contact between an older teacher and a younger pupil. This, clearly, restricted the scope of education since one person's knowledge and experience could only be transmitted to a limited number of people. Of course, books were being written and copied by monks or town scribes, but could only be produced in limited numbers. Therefore, until the discovery of the printing machine by Gutenberg in 1445, the problem of mass literacy did not exist. Mainly scholars, monks and nobility needed to learn how to read and write. The rest had to rely on the spoken word for information acquisition and transfer.

With the first printed book a whole new era started. Towards the end of 15th century there were about 1000 printing presses in operation and perhaps 10 million copies of books produced, more than the total of manuscripts written during the whole of the previous centuries. As more books became available, this created a new group of people, namely 'readers'. Authors could communicate and inform their readers. Books became vehicles to transmit individual or collective experiences to masses. For pupils, in addition to the direct contact with the teacher, the printed book provided another means of acquiring knowledge.

We must emphasise the relationship between the level of technological attainment (typesetting, paper production, rotary printing, etc.) and the level of literacy and the expansion of knowledge and culture. Today the printing technology has advanced to such an extent that since 1950 the number of books produced has been more than all produced previously and according to some estimates every year about two books are printed for every inhabitant of our planet. This is a veritable information explosion.

To sum up, a whole new information era started with the invention of the printing press where a technological breakthrough made possible new ways of information storage, transfer and transmission, creating new industries, new requirements. Access to information through printed text became a basic need, hence every citizen's right to literacy.

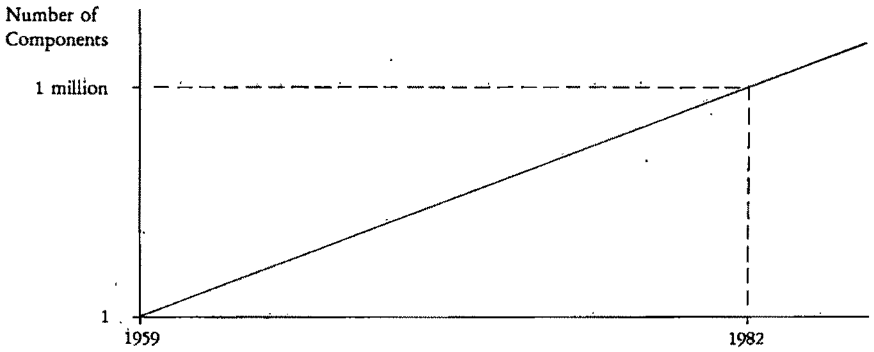
3. Technology

The new technologies that relate to information handling can be considered in three distinct yet rapidly converging sectors: (1) electronics, (2) computers and (3) communications.

Electronics

The remarkable progress of electronics can be traced back to the invention of transistor at Bell Laboratories, USA, in mid forties. The first planar transistor was built in 1959 which meant that an electronic component could be formed on the surface of a silicon wafer. From that point onwards the number of components that can be built on silicon doubled every year until today.[2] This is the well known Moore's law as plotted in Fig. 1. For the moment, this rate of progress has shown no signs of slowing down, a remarkable achievement for any technological progress experienced in human history. The miniaturization that followed made it possible to build products in a wide variety of fields, including computers and communications.

FIG. 1. *Moore's law*



Computers
Over the last three decades or so the progress of computers followed very closely the advances made in electronic components. We can discern three main development streams, each associated with a particular segment of computer industry as shown in Table 1: (1) mainframe, (2) minicomputer, and (3) microcomputer.

	1950	1960	1970	1980	1990
Mainframe	Tube	Transistor		Supercomputers	
			Timeshare		
			Networks		
Minicomputer		8-bit	16-bit	32-bit	
		Industrial		Data processing	
					Local Area Networks
Microprocessor			8-bit	16-bit	32-bit
		Single chip microcomputer			
				General purpose microprocessor	
					Super microprocessor

TABLE 1. *Various types of computers*

Mainframe computer history goes back to the fifties when the first electronic tube machines were produced. The real exploitation of computers, however, started with transistor machines introduced in the sixties. These machines were in general large scale installations, requiring trained staff to run them. As these installations needed major investment, their proper utilization became an important concern. This led to the introduction of time sharing techniques to expand the user base and provide better services. At the beginning of the seventies, networking of mainframe machines started with the prime objective of sharing facilities and applications amongst the computers linked to the network. Today public telecommunications authorities offer network services.

Minicomputers were developed initially for instrumentation and process control applications and therefore they were machines of low cost, limited computing power and software yet they could be easily tailored to satisfy application requirements[3]. As technology progressed, these machines very quickly acquired extra power and more suitable peripherals. Once general purpose machine capabilities were achieved, in the seventies, minicomputers started moving into more traditional data processing markets. Currently, much work is in progress to link minicomputers in a given site by means of a Local Area Network (LAN).

During the early seventies, electronics technology made it possible to place all the circuits of a computer processor on a single silicon chip. This started a whole new era of microprocessors and microcomputers. First 8-bit machines were produced. Today, a number of 16-bit microprocessors are commercially available. It is also known that 32-bit machines are being produced. There are many types of circuits which could be classified as:

(1) The single chip microcomputer which includes processor and memory on a single chip designed for mass embedded systems (terminals, cars, washing machines, etc.).
(2) The general purpose microprocessor designed for embedded systems as well as for building low cost microcomputers (example Z80).
(3) Super microprocessors which are high performance circuits achieving minicomputer capabilities (example Z8000, Motorola 68000).

The impact of microprocessors had two main consequences: (1) to extend the lower end of the computer spectrum so as to make mass utilization of the computer possible, (2) to make the computer a circuit component so that it can be used in many new products to provide a higher degree of intelligence and automation.

Communications

Application of the new technologies have vastly improved the local and global telecommunications networks and made it possible to introduce new services. Without discussing these, the following partial list perhaps illustrates the scope of new telecommunications techniques and services that are being introduced today:

- Cable television
- Fibre optics networks
- Digital data transmission
- Computer networks (X25 standard protocol)
- Satellite communication
- Teletext
- Viewdata
- Local Area Networks
- Facsimile

4. Information technology

Like the invention of the printing press, the combination of computers and communications is bringing about a new phase in human history, the so-called post industrial era. This is due to the multitude of interrelated products and services that are being developed to acquire, process, store and access information electronically in a way that has never been possible before.

It is interesting to note the similarity of the new technologies and the printing press, where volume production of electronic circuits and circuit boards are done by processes very similar to printing. The same process can cause information to be written permanently like a Read Only Memory (ROM) or videodisc. Information can be gathered from diverse sources. Access to electronic information is rapid. The information to be handled can be textual, aural or visual.

One fundamental difference of electronic media as compared with printed media is that an individual has a two-way interaction with an active information handling environment whereas a book is a passive medium. We can illustrate this aspect by the BL's 'BLEND' project where accumulation of human knowledge, in this case publication of research papers, is done collectively by a number of researchers in an interactive manner.[4]

We should also point out the economic dimension of this new era. It is predicted that we are moving to an economic phase where the creation of economic wealth is based primarily on information that relates to enquiring, communicating, evaluating and deciding. Thus the information sector is seen as a growth area like the service industry whereas agriculture, mining and heavy industry are predicted to decline.[5]

The mass utilization of information technology is creating a new group of people: 'information users'. Like the literacy problem introduced by the printing press, we now have a new mass requirement of 'Computer literacy' or the 'Second literacy'.[6] We can see this becoming as essential as everyone learning the three Rs.

5. Computer literacy and the polytechnics

Information technology provides many challenges and opportunities for polytechnics. Many of the techniques are still in the experimental stage and much development work needs to be done. Once these are developed, they need to be applied on a massive scale, requiring a vast educational programme. We need to consider the following aspects:

(1) *Educational technology*

With the introduction of information technology in addition to teacher–pupil personal relationship and books, we now have the two-way information technology–pupil interaction to supplement the traditional teaching environment. The Computer Aided Instruction techniques and their limitations are well known. With information technology, however, we have a new environment. For example, a home television is now also a computer terminal and hence, a device whereby a student may interrogate his teacher or the author of a technical article. Much development work is needed, however, as far as teaching methodology is concerned, particularly preparation of adequate course material in various disciplines to exploit the new technology. Here lies a vast challenge and opportunity for polytechnics.

(2) *Use of information technology in various discipline subjects*
Information technology is all pervasive. Hardly any discipline remains unaffected. This requires Polytechnics, indeed all professional educational institutions, to provide courses that reflect the changes and new approaches that are required due to new technologies. This not only necessitates constant updating of syllabuses but also provision of appropriate information technology facilities.

(3) *To train information technology professionals*
This requires a new approach and new course design. Traditional computer science degrees are not sufficient to meet the demands of professionals who will work in a complex IT environment.

(4) *Continuing education*
As the implications of information technology is felt more and more in all aspects of professional life, a vast re-training job will have to be done for those who had little or no computer exposure during their studies. Polytechnics have been doing this for some time like PCL's short courses in minicomputers and microcomputers. There is a new urgency and scale of needs to which polytechnics must respond.

(5) *Computer literacy for the general public*
Until the second literacy is recognized as part of the primary–secondary education system, Polytechnics will have to fill this gap. With the development of personal computers, there is great public interest and awareness of computer power. It is not clear, however, beyond the general awareness aspect, what are the basics that every member of society has to learn about modern information handling so that with equal ease, say, he/she could interrogate a teletext terminal for airline bookings, use a home terminal for banking, or learn computer programming. The man–machine interaction and standardization of information handling is still a basic research area.

6. Conclusions

This is Information Technology Year, an indication of the scale and importance to everyone of these recent developments mentioned in this paper. Clearly, polytechnics have much to offer in taking part in the development work, creating a new teaching and research environment, and undertaking training programmes to meet the second literacy requirements. In a rapidly changing field, however, bold initiatives are needed in terms of course organization, application of new teaching techniques, providing adequate facilities, etc. As the UK's future is seen as being related to how well information technology is exploited, the polytechnics' future will also depend on how they will meet these new challenges.

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Information technology and its applications in polytechnic libraries

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Introduction

IT IS THE PURPOSE of this paper to pick out some of the general trends in development of information technology indicated by Professor Paker and identify their relevance to library and information work in polytechnics, although many of my remarks will apply to other institutions of higher and further education. However, before considering the technology in some detail, it is worth reviewing why after many years of developments in computerised library services we find ourselves at present discussing information technology and library applications within the framework of IT82.

There is at present a heightened level of debate within the library profession on the impact of technology on libraries and information services despite the fact that many individuals are quite familiar with computerised housekeeping, management facilities and information retrieval and I would like to enumerate some of the factors involved.

1. Hardware costs both in terms of processing and storage have fallen and will continue to fall dramatically whilst increasing in capacity and power.
2. More and more services and functions with which we are associated in our everyday life are being computerised, to the extent that computer technology is integral and crucial in the operation of our society.
3. In turn this is leading to a vast array of products reaching the market aimed at businesses large and small, government, institutions, the private consumer, and of course libraries.
4. Nevertheless there is still a high level of unawareness and puzzlement amongst the general public and also, I think, librarians concerning information technology, which the IT 82 campaign is seeking to combat.
5. Finally, and most importantly, Information Technology represents a convergence of many technologies to produce new aspects to the living and working environment. Not least amongst these technologies are telecommunications, which are being developed to the extent that computers, people and the media can communicate so freely that electronic communication is well on the way to

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becoming the primary method of transferring data, text, ideas and news, which are all components of information. Information technology is becoming therefore extremely pervasive.

I now want to turn to the technology itself which is causing this level of debate and divide it into three main groups:

Hardware — Processors
Memory
Mass Storage

Software
Telecommunications

Hardware

The important fact about hardware is, I suspect, well known to this audience namely that during the short history of computing there has been an exponential decrease in the cost of computing hardware in relation to its power. The earliest DEC minicomputer, the PDP-1, cost $120,000 but could be replaced by the much more powerful PDP-8/1 in 1968 for $15,000.[1] An example nearer home is that a minicomputer configuration purchased for dedicated library applications in 1975 at around £100,000 at 1975 prices can be replaced now by one which executes programs five times faster and possesses 32 times more memory for about the same figure at today's prices. This of course is a huge decrease in real terms. The position regarding microcomputers is even more striking as we shall see.

These comparisons are rather crude as it is difficult to isolate in a total package the cost of various items, as software and peripherals will be included in the deal and no two deals are alike. However they do convey the scale of the phenomenon of the computer industry in which you continually get more and more for less and less. As Kubitz[2] has succinctly put it 'there are very few analogous events in history'. If, however, we look at some of the components involved in this phenomenon we can derive a clear perspective of the economies of scale in manufacture over the recent years and the implications this will have in the short and medium term for information technology. Everybody knows that at the heart of this phenomenon is the development of the silicon chip. In particular, figures for the development of processor and memory chips provide a striking example of progress over a short period. In case of any confusion between microprocessors and microcomputers let me define the processor as that part of the computer which performs the computing function such as executing a program whilst a microprocessor is a processor for which all circuitry is on a single chip. A microcomputer is a computer based on a microprocessor combined with keyboard, display and data storage facilities. If we look at the rate of development of microprocessors we see that the word length, which is an indication of the power of the microprocessor, has increased from 4 bits in 1972 to 32 bits in 1982.[3] The current state of the microcomputer business is that microcomputers with 16-bit microprocessors are now on sale in the UK although there is relatively little proven applications software available. In marketing terms they are competing with minicomputers particularly in the business and research fields. One implementation of the

Z8001A CPU sold as the Zilog Z-lab has in its promotional literature been compared favourably with the PDP 11/70. In the case of RAM memory chips which hold the information directly accessed during the computing process product research has progressed from 64 Kbits in 1979 to 256 Kbits in 1981 with projections ranging from 1 mbit upwards from 1985.

Mass storage is also important in this overview of market trends. Many librarians are familiar with the medium of magnetic disks used as the standard means of storing online bibliographic and other data. In the mid-seventies 50 megabytes of disk storage cost in the region of £20,000 whereas 300 mb are now available for around £11,000. In turn conventional disk technology is being challenged by the Winchester disk which in its infancy is offering 40 megabytes for around £6,000. Winchester disks are attractive as they require no special environmental conditions and can be integrated physically into a convenient unit with other hardware. The greatest potential, however, lies with the optical disk which offers the prospect of storing large amounts of text, even whole libraries, in a very small space. Libraries are likely to use a combination of the two optical disk technologies, analogue and digital as they make available the benefits of high resolution and digital operations respectively.

Finally to give an overall picture of current microcomputer availability here is the general specification of the recently advertised Wicat S150 microcomputer offered at under £6,000:

68000 16-bit central processor
Z8000 16-bit screen processor
10 mb. integral Winchester
125 kb. RAM
3 user capacity

Software

These remarkable changes in hardware availability are of little value without accompanying developments in appropriate library software. Library software particularly for real-time houskeeping functions is tricky and expensive to produce. This is largely because of complexity of transactions, the high value placed on integrity of data and the sheer volume of data to be stored and processed. Estimates for true software costs are extremely difficult to make either for reasons of commercial confidence or because software developed inhouse or by cooperatives is rarely marketed on a commercial basis, however a reasonable guestimate for the software element of a typical minicomputer library system costing between £100,000 and £150,000 might be between £30,000 and £50,000. Alternatively one could think in terms of £10,000 to £20,000 per module. However we are faced with the prospect that hardware costs will continue to drop and that economy of scale will have a beneficial effect on the overall cost of library systems, which in turn should bring down the cost of the software element in an expanded market. In particular, microcomputer based systems will necessitate a restructuring of software costs. It would be unrealistic for instance to market a database management package transferred from a minicomputer to a microcomputer environment at the same cost. To summarise the situation, the following seem to be the main likely trends in library application software.

1. Software development costs will continue to rise in real terms.
2. By far the greatest proportion of the cost of a hardware and software package will be software, i.e. at least 80–90%. (We have already seen an information retrieval package offered for £12,500 with a free microcomputer thrown in).
3. Nevertheless the overall cost of hardware/software packages can be kept down because of volume production.
4. There will be an increase in the market because of the attractiveness of library systems to smaller libraries.

Telecommunications

In addition to the economic factors of hardware and software development, telecommunications are a crucial factor in the increasing pervasiveness of information technology. It is all very well for computers and software to be very cheap and available for librarians in all sizes of library, but transfer and efficient flow of electronic information can only be achieved through the establishment of accessible, speedy and reliable networks. In this field also the technology is changing and the prospects are really dramatic even if the immediate practical and commercial reality is somewhat more sober.

At present library services telecommunications are almost entirely based on the connection medium of the telephone cable. This has been a natural progression from the adaptation of the voice network for data purposes. However two factors are changing this position.

Firstly new media are becoming available which give greater potential for broadband transmission (the sending of large quantities of data at high speed) such as:

Coaxial cable
Fibre optics
Lasers
Satellites

Secondly there has been a relaxation of the telecommunication monopoly in Britain. Until recently any data link connecting machines outside a single building or campus has had to go entirely through British Telecom facilities. This has now been relaxed due to:

The economic philosophy of the government;
A demand for services which British Telecom cannot meet;
Competition in terms of new media offered.

At present the usual method of transmitting data is by circuit switching in which the circuit leading from the user to the computer or computer to computer is occupied for the duration of the call or the message. Packet switching breaks down the message into packets which are transmitted separately interspersed with other traffic and reassembled at the destination. There is obviously great potential here for maximising the usage of the network by increasing access and speed. This technique will be of great importance in improving telecommunication facilities on two scales:

1. The National and International data/telephone network or Wide Area Network (WAN).
2. The Local networks or Local Area Networks (LAN)

Librarians are increasingly familiar within the wide area network through use of the cooperatives, BLAISE and information retrieval facilities such as Euronet. The local area network is likely to produce a more noticeable effect on library organisation, services and methods.

Local area networks

The local area network can be defined as a method of connecting computers and peripherals within a restricted area usually within a building or adjacent buildings. Its main features are as follows:

1. Broadband transmission at anything over one megabit per sec i.e. a hundred times faster than the public network.
2. Low error rates.
3. A high degree of hardware resilience.
4. Distributed processing allows local control and maximum use of network.
5. Hardware resources such as printers and disks may be shared.

The most well known types of local area network are Ethernet and the Cambridge Ring. Local area networks are being marketed under many proprietary names such as Ethernet itself, Hynet, Zynar, Z-net, Link 480Z, Polynet (Logica), Midlectron, Toltec, Xinet, Econet (Acorn), Net/One, ARC (Datapoint) and many others.

The practical effects of adopting local area networks in libraries will be that individuals or groups will have their own computing facilities as appropriate and expansion and sharing of resources will be achieved through networking. Specialised library services will become increasingly integrated with office automation and the general information processing function of the institution or company.

Applications of IT in polytechnic libraries

Whilst it is now fashionable to desegregate housekeeping functions from other information activities it is nevertheless useful for our purposes to preserve the distinction. Up till now there has been a predominant concentration in polytechnic libraries on technology related to housekeeping. Certainly there has been only a fractional investment in computerised information retrieval compared to other functions. This is partly due to administrative needs and partly due to the fact that the time was not right in terms of the wider social and economic factors of IT I have mentioned.

Housekeeping

Most activities identifiable as housekeeping functions and certainly all those listed below have been computerised by one polytechnic library or another.

Cataloguing
Circulation

Order and receipt
Periodical control
Word processing
Management information
Finance

Few libraries, if any, have computerised all these functions and despite much work in this direction during the last decade no system has provided total integration of applications although this will eventually come. I suggest that the next phase in housekeeping functions is one of consolidating and refining activities using new techniques and new hardware at the appropriate time rather than one of startling conceptual innovation, with the following general trends:

1. More and more services for less and less (capital) cost.
2. More processing and storage inhouse.
3. More integration of applications.
4. More public access.
5. Easier connection with wide area networks for bibliographic control, book ordering, interlibrary loan and information retrieval.
6. Smaller libraries will invest in IT.
7. Book related activities will be subject to limited growth and will eventually diminish.

Reader Services
It is in the area of reader services that the greatest impact of IT will be felt in polytechnic libraries. Already we are facing delicate decisions in a time of economic restraint between allocating resources for traditional printed materials on the one hand and the other for information from electronic sources. We rarely question the desirability of building up the book and periodical stock but consider very seriously even quite tiny investments in information retrieval. This will change. We can usually see a quite tangible return from our investment on a search. There is not usually this level of feedback on decisions relating to stock selection. In purely practical terms the change will be forced on libraries as the publishing industry moves towards electronic media.

That is taking a rather negative view of the pressures emanating from IT. On the positive side there is a tremendous opportunity for libraries and librarians to play a dominant and active role in controlling, developing and marketing new services and expanding existing ones. This potential has already been recognised by others if not by ourselves.

These are some of the applications which will become increasingly available in the short and medium term and, I envisage, will attract substantial investment of resources.

1. Remote retrieval — Secondary sources (as now)
   — Primary sources (just beginning).
   — Facsimile.
2. Local retrieval — Enquiry and reference files
   — Bespoke databases and information collection for groups and individuals.

3. Current awareness.
4. Selective dissemination of information.
5. News, communications, electronic mail.
6. Software access to the public
    - Information retrieval and database management packages.
    - Computer assisted learning.
7. User education packages.

The underlying implication behind these developments is that we will see a reassertion of the information intermediary role of the librarian or information officer with particular emphasis on user specific service and the development of current and ephemeral reference work particularly through the medium of viewdata and electronic mail. This will be balanced by an increase in user independence whether in information seeking or learning resulting in an overlap between traditional roles of teacher, computer centre and library.

Developments in library systems

A typical polytechnic library computer system consists of a minicomputer linked to disk storage, terminals and specialised data collection units. It may be characterised as highly centralised (whether linked to a cooperative or not) in which processing is remote and transparent, and with limited applications. A future library system could be a local area network with microcomputer workstations for reader services and housekeeping, shared printing facilities, shared file storage and shared storage for database and catalogue functions. There would still be low cost terminal access to the system for public use. Gateways accessible from any point in the network will give direct access to external services such as the international packet switched service for information retrieval, BLAISE and the national database, the cooperatives, and there would be gateways to other services within the polytechnic. Within the polytechnic as a whole other local networks for administration, teaching, student records might be linked to the library network thus providing information services directly to many locations within the institution.

What is being suggested, therefore, is an environment in which library services are very closely integrated with the information activities of the institution as a whole, receiving and transmitting information in a wider manner. Thus greater accessibility will imply less emphasis on the physical location of the library but probably a greater dependence of the community on the services it provides.

Interconnection

Clearly all of this interconnection is not going to happen overnight, and a high degree of standardisation will need to be achieved before it can happen. This standardisation can be achieved in either of two major ways:

1. Formally by national and international agreement.
2. By market force acceptance of the market leader for the given technology.

These two forces are constantly in action and to a considerable extent in conflict. Obviously manufacturers cannot wait for agreements to materialise before marketing their products and, once marketed, diversity of product makes standardisation difficult to achieve. However work on standardisation continues both in general terms for Open Systems Interconnection and for specific applications such as interchange of bibliographic data.

Conclusions

I consider that IT82 which provided the impetus for this seminar has a particular relevance for polytechnic libraries. It is worth noting that within the Information Technology Division of the Department of Industry there has been established a 'Focus Committee' to encourage standards and thus develop Britain's role. The areas specifically selected for support are Local Area Networks, Viewdata and Open Systems Interconnection which are all fundamental to the developments I have described.

Polytechnic libraries have always been less devoted to collection building and archival functions than for instance the university institutions. This will make any transition period into the electronic era less painful.

Many polytechnics are multi-site institutions with particular implications for management and resources. Decentralised institutions stand to gain more in proportion from information technology than do centralised ones.

Polytechnic libraries have not hitherto been particularly prominent in research into information technology, all the major early projects having been based in universities. Polytechnics have a great contribution to make and I hope this situation will change.

Despite the diversification of the last decade we are primarily technological and information based institutions. The libraries should be playing their part in demonstrating their technological awareness and ability to keep up with developments which will have a profound effect on society.

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Trends in information provision in polytechnic libraries

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Paper presented at the COPOL seminar 'IT82: a polytechnic response' at the Polytechnic of Central London, 1 July 1982

The information aspects of information technology are considered with particular reference to polytechnic libraries. The automation of library housekeeping is examined retrospectively and its relevance to users criticised. The library catalogue is assessed in particular and suggestions made for its future development. Online information services and similar primary online services are discussed and the present position examined. The slow development of online services is criticised. These developments are placed in the context of the library and polytechnic network and conclusions drawn as to likely futures for the academic library. Finally, the role of the academic librarian is discussed and deprofessionalization argued.

Introduction

In Information Technology year much emphasis has been placed on seminars, exhibitions and publications on the technological aspects of IT and little on the information aspects. I have taken my brief as being to explore the current and future trends of information provision with particular reference to polytechnics and similar academic institutions.

To this end, three areas of information technology application have been identified and in each case the organisational and economic considerations identified and discussed. The three areas are library housekeeping, secondary services and primary services, which, although they are recognisably interdependent, do provide suitable headings for examination.

Library housekeeping

The first of these concerns library housekeeping and administration. It is one I will not dwell on except with regard to its implications for information provision. It has been the preoccupation of polytechnic libraries over the past decade, more so than any other areas of Information Technology application. Each institution has had to decide its own priorities and priority appears to have been given to the automation of cataloguing, especially within multisite libraries where the provision of a union catalogue has been a prerequisite for some inter-disciplinary and inter-site courses.

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The minority of libraries with large single sites have been preoccupied with the automation of circulation systems to cope with increasing issue traffic and control.

By 1980, the majority of Polytechnics had already embarked or were embarking on computerisation of their cataloguing or circulation systems; this is clearly indicated by a COPOL survey in 1981.[1] Moreover, this survey showed clearly the extent of penetration of the co-operative and centralised services; a result of both economic considerations and the lack of computing knowledge inherent within most Polytechnic libraries. Few have had either the technical expertise or the time to develop in-house systems and this applied even more so with the advanced online systems now being used.

Libraries have adapted to these systems easily, and tended to organise themselves with a structural division between technical services and reader services. However, the increasing use of automation, especially with the newer integrated systems, have made this an unreal and at times an uneasy division. Automated circulation systems, for example, cut across the boundaries of reader services in terms of stock management and operational control and highlight the necessity for inter-departmental groups to plan, develop and manage systems. More importantly, in terms of information services we are likely to move towards interconnected and integrated systems which will be geared much more towards the needs of the users and thus the reader services staff will have increasing influence over such developments.

To illustrate this more clearly, consider what impact library automation has had on the polytechnic reader over the past decade. It could be argued that it has been very little. Consider circulation systems which, though they have done much to enhance the control of library stock, have been little utilised to provide management information which in turn can be used to direct purchasing policies or adapt loan regulations to users' needs. Consider the provision of acquisitions and current awareness bulletins which, though occasionally automated, have not been made selective or distinctly user orientated. Finally, consider the library catalogue which, to all intents and purposes, has remained much as it was, albeit in a new physical format.

Whether on cards, COM, or even online, the catalogue has remained largely a derivative of the sort developed a century ago. As Williams points out, 'We have perfected the catalogue which has existed for more than one hundred years without significantly improving the kinds of bibliographic and subject access that the catalogue might provide'.[2] These deficiencies have been brought to the fore by the development of commercially based online information systems which have given library users a new dimension to subject access which the conventional catalogue cannot meet. Indeed, the possibility of reducing the catalogue to a limited finding tool, but backing it up with these sophisticated services, is one which has been widely debated. However, I would argue that this would be a retrograde step. Most Polytechnic libraries have collections which are capable of meeting the majority of users' needs if effective access is provided—and at a time of falling book funds it is important to exploit such collections to the full.

What then of the future of the catalogue? We should be looking towards not merely an online version of existing catalogue files, but a true library database with access points extended from the 2–3 average now employed, to multiple access based on plentiful added entries and extended subject descriptions. Users will be able to go to a terminal and do a complex information retrieval search on the library catalogue based on boolean logic and extensive annotation of records. They will be able to check the availability of a document and reserve it if it is on loan. Having done their search, they will be able to either print out references or record them in their own personal file which they can come back to a day or a year later. Academics will use this facility for their booklists, enabling students to look up recommended texts.

Comprehensive subject access of the type I am considering may sound staff intensive, but we should be in a position where the majority of bibliographic records are obtained through a central agency with the minimum effort on the part of the library. Indexing could be largely uncontrolled, leaving the system to refine searching. Free term indexing has been shown to be beneficial for the end user. Indeed, academic libraries should already be planning for these developments by building files which have extensive subject information attached to the record.

Secondary services

I have already mentioned online information services, and there is no doubt that the importance of them to polytechnic libraries has been substantial. These services began in the USA in the early 1970's and married computing technology with telecommunications. By 1974 they were available within the UK and the main suppliers then are still the main suppliers now, they being Dialog, SDC and NLM (Medline). By 1979, the EEC had established a European telecommunications network termed EURONET which could support host computers supplying information retrieval services. The growth of these systems has been substantial, to the extent that there are now reckoned to be some hundreds of systems worldwide, providing access to some 28 million bibliographic records. EURONET alone has now 35 hosts with 330 databases, and the industry is reputedly growing at 30% a year.

U.K. academic libraries have not been slow to adopt these new techniques and recent surveys[3,4] have shown almost 80%–90% of them are providing online services. However, I would introduce a note of caution to this catalogue of success. It is still the case that online information retrieval accounts for a mere fraction of a percent of most Polytechnic library budgets. An average figure of £2,500 is probably correct.[5] The question must be asked as to why we have not become as involved as our colleagues in government or special libraries. There are a number of possibilities:

- It may be a continued lack of commitment amongst many academic librarians to a positive information role. This problem is often exacerbated by decreasing staff time as professional staff have to commit themselves to more and more covering of routine duties. But there is also some ambivalence amongst many academic librarians as to how much they should be involved in providing information rather than educating or orientating readers, especially where undergraduates are concerned.
- It may be that the real requirement for in-depth or even for brief literature surveys is limited. However, this should be disproved by the continuing high expenditure on printed abstracts that most polytechnics have. But even this begs the question as to whether those printed abstracts are used.
- It could be sheer conservatism and inertia, not just on the part of library staff but also academic staff. This could be coupled with a naive approach amongst many librarians to marketing online services to potential users.

- It may be that the institution of charges for online services for reasons which have been well argued[4] does act as a disincentive to expanded use.

Likely as not, it is a combination of these four; but, these points apart, there is no doubt that online will play an increasing part in the bank of information services that we can call upon. Moreover, further developments are taking place other than a simple extension of the range of services.

Trends in online

The first of these is another result of the increasing availability of computing power with decreasing cost. Local computing power enables a number of tasks to be achieved without access to the relatively expensive mainframes. These could include[6]

- Storing searches to be transmitted to the online system at telecommunications speed, rather than at the speed of a typist. Searches may still need refinement but reduce some connect time. Searches can be repeated to provide an SDI facilitiy as the database is updated.
- Often repeated commands can be stored, including log on procedures, selection of certain well used databases and log off.
- More sophisticated systems can act as a terminal log, noting connect times, search costs, etc., and even invoicing customers if a chargeback is instituted.
- Importantly, there is the facility to trap retrieved records on a local storage device and keep them for browsing later. Alternatively, a word processor or word processing package could be used to tailor them into a bibliography, or they could be recorded to a separate file to build a local database. There are, however; serious problems of copyright in performing these operations with some databases.

These kind of facilities could be tailor-made, or utilise a general software package running on a microcomputer,[7] but they all point in the direction of making the system easier for the user. This is a second key area of development.

'User friendliness' is perhaps an over-used term which has been applied to systems which merely personalise the interaction, e.g. 'Hullo, I am . . .'. Real user friendliness is yet to come and will embrace at least three general developments.[8]

(1) Command languages. The majority of online users are now involved in searching multiple computer systems and the intricacies of each system can deter the casual or new user. The provision of a standard command language could overcome this, but, although the Euronet CCL has been widely implemented,[9] it is unlikely to find favour with the very major online suppliers. An alternative is the use of a local microcomputer to translate one standard query language into those of all the commonly used hosts. Thus, the naive or end user will need only to learn one query language.

(2) Systems that help in constructing search profiles by suggesting possible search terms or related terms. This is already done to an extent on most systems where access to the dictionary or inverted file allows the user to select appropriate search terms. More advanced systems will show relationships between terms, and suggest alternatives. Some of this could be done on a local computer before connection to a large remote system.

(3) More advanced systems will be able to automatically translate or map questions posed in natural language into the system language. Users will assess the output for relevance and the search will be refined automatically, based on the users recommendations.

In-house online systems

One further problem of these online systems it the inappropriateness of some of the information or databases that they provide. Again, the provision of cheap local computing power may overcome this lack of 'mission orientated' files. It is now feasible to provide in-house, microcomputer based, online information retrieval at a price within the reach of even the smallest academic library.

There are now several software packages available, such as that developed at the London University LRCC,[10] the Kent Barlow Eagle Eye and Homer[11] which emulate the large online retrieval systems, even to the extent of utilising the Euronet Command Command Language. Such packages sell for modest sums of around £300 and run on a microcomputer. A complete kit of hardware, comprising a microcomputer, a printer, floppy disks, and a Winchester disk drive, can cost as little as £6,500 and will support a database of tens of thousands of records. Additionally, word processing packages enable users to produce tailored bulletins and bibliographies and undoubtedly will eventually have all the nuances of the highly developed larger systems.

The application of these facilities within Polytechnic libraries must come. Most have some specialised journal or report indexing service, which though staff intensive, have been maintained over the years through their appropriateness to groups of users and their ability to provide hardcopy back up. Such facilities, without the constraints of connect time and communication costs, may allow online information retrieval to finally emerge as a day to day user tool. Moreover, the staff intensiveness of compiling in-house databases may be alleviated by stripping records from the major online system and integrating them into their own high quality database. Again, copyright is a problem, but database producers may choose to effect changes in charging mechanisms which permit freer use of data. The potential is great and could extend beyond constructing purely bibliographic files to files of research expertise, of computer software, of consultants, etc.

Economics

The cost of online has remained almost static for some years, levelling at between 50p and £1 per minute overall, with an average search costing between £10 and £20. Thus, in real terms the cost of online has fallen and will probably continue to do so for some time. However, if online does eventually begin to have an effect on the sales of printed abstracts then it is likely that database producers will have to raise royalty charges and eventually begin to raise the costs of online information searching. Presumably this will not occur until we overcome the barriers I spoke of earlier.

Full text systems

The limitations of secondary services are apparent. Readers are subjected to delay or referral and consequent frustration or failure. Systems with online ordering, otherwise known as direct document delivery, do little to compensate. Moreover, they could easily work out expensive for an academic library where they would duplicate existing stock. Indeed, this may be the reason why such facilities are not widely used.

The alternative of course is to computerise the whole of the original document or item, and provide it online so as to allow immediate access. Such full text systems are already in evidence in a number of ways. Firstly, some organisations have established files which provide numeric, physical, chemical or similar quick reference data for immediate analysis. These services, often termed databanks, may have increasing relevance to libraries, especially in the area of statistical information. Similarly, some full text systems provide extensive abstracts or summaries of documents which can be used as a surrogate for fuller information or constitute the full information itself. Examples include the LEXIS[12] legal information services, the New York Times information bank with brief newspaper cuttings and the POLIS system which indexes Parliamentary Questions. The British Telecom Prestel service, though it has a number of other facilities, could also be said to fall into this category.

All of these services point the way to the publication of information in a total electronic form which readers can access not just within the library but from any convenient computer terminal. Such electronic books or journals would have a number of advantages, their chief one being their interactive nature. Readers could make comments on journal articles or even add or amend 'documents'. It would be possible to supplant traditional refereeing by ranking items by levels of use or citation.

One of the limitations of these facilities is the poor ability of most computer systems to display graphic information. But even this will be overcome by the videodisk. Videodisks have the capability to store massive amounts of information; estimates for 1982 for example quote 20 billion characters or 500,000 journal pages or 500 journal volumes[13] with possibilities rising to 2.5 million A4 pages. Incidentally, these phenomenal capacities may lead back to distributed information services.[14] *Chemical Abstracts* for example could be held on videodisk and accessed by a local microcomputer. New disks would be issued at regular intervals. The commercial and domestic use of videodisks would also ensure cheap and easy availability.

Moreover, videodisks can store both graphic and digital information. so that tables, illustrations, etc., could be included alongside text and indexes stored digitally. The Pergamon Inforline Video-Patsearch,[13] for example, stores graphic information derived from patents, although it uses a conventional online system for information retrieval. One could envisage other applications such as geographical data, museum slide sets, etc.

Importantly, such facilities have enormous implications for education. Already electronic text books have their place in the form of computer aided learning where interaction is used to direct the student through a learning process. There are a number of advantages to CAL.[15] It has the great advantage that it is fun. Students can work at their own pace and make mistakes without the embarrassment of a group or the chastisement of a teacher. Graphics and animation can help in explaining difficult concepts while having infinite patience. Computer managed learning allows the student to assess his own progress and can direct him or her to remedial aids, to conventional learning packages or alert tutors of the need for personal guidance. Learning can thus be done at a distance and requires a physical environment to a lesser extent. Such systems are having rapid growth at the school and FE level and proprietry software is becoming avilable through recognised publishers, such as Longmans. The CEDAR project at Imperial College has sought to develop and extend CAL throughout the educational spectrum.[16]

Impact on the institution

If then we gather these ideas together and look beyond the next few years, the impact of it on the Polytechnic could be considerable (Fig. 1). It is likely that these library systems on mini or microcomputers will be interconnected through a local network. This in turn could be connected to other libraries and computers through national networks. British Telecom propose that the U.K. PSS service will eventually act like the telephone network, but having computers at each location rather than telephones. It is likely that Polytechnics themselves will have networks where terminals in laboratories or offices will all interlink and these too could connect to the library. Finally it may be possible to use the Prestel Gateway facility to link to peoples' homes.

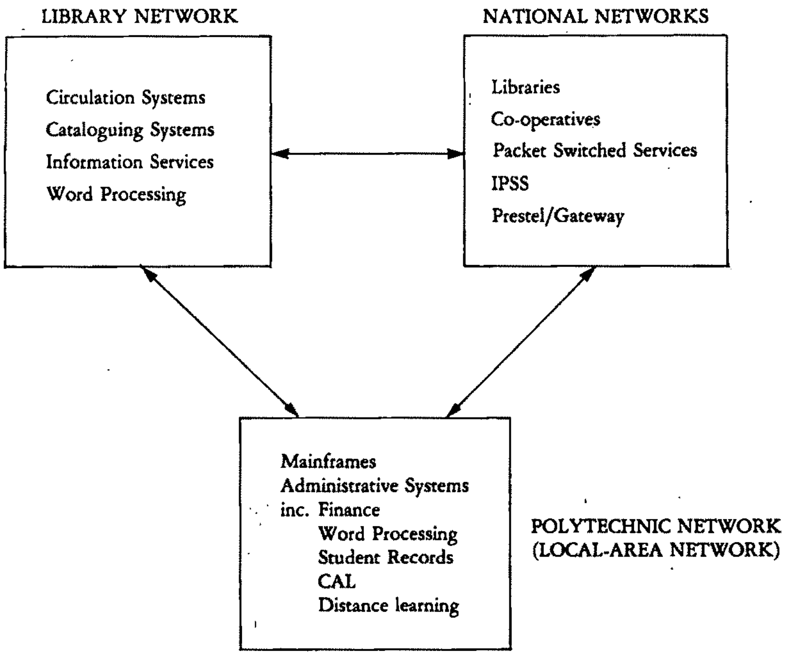

Fig. 1. *The library information network*

The major implication of these developments is the breaking down of the information barriers currently caused by the difficulty of locating printed sources in more than one place. The concept of the library as the central information and learning resources store could dissolve, leaving the library as an archival collection. Alternatively, it could provide an opportunity to the library to have wide central or overall control of all aspects of the learning and information process.

Librarians role

Indeed, speculation about the future role of the librarian in all this has been commonplace. There is no doubt that in the short term, library automation in general, and online information searching in particular, have given the academic librarian a new and enhanced status. Online almost places the intermediary, i.e. the librarians, into a counselling role where they can use their skills to elicit users' real needs and translate them into the intricate magic of the retrieval system. But this professional mystique is unlikely to sustain itself for a number of reasons:

- Firstly, the level of computer literacy amongst students or even the population at large, will be far higher in the near future. Indeed, the BLRDD is actively supporting projects to encourage appreciation of information storage and retrieval at the school level.
- Secondly, the user friendly systems we have already discussed will soon overcome the few remaining barriers to quick and easy use of online systems.
- Thirdly, the general level of appreciation and understanding of online services is bound to rise as the online vendors seek out new markets. 'The vendors, competing with each other for maximum system use by all potential customers, provide training sessions for librarians as well as non-librarians employed in research facilities, using the systems. Database producers . . . are even more aggressive in reaching out to non-librarian researchers as a means of building clientele'.[17] A good example of this is the marketing of LEXIS directly to professional and academic lawyers rather than librarians.
- Finally, costs which are based less on connect time, but more on relevant information received, may encourage the less experienced user to have a go.

This is but one example of the possible de-skilling or de-professionalisation of the librarian, but others could be noted. For example, the production of a selective bibliography which was once considered a professional task of a high order is now routine and commonplace.[17]

Moreover, such trends will not only effect junior professional staff but also middle and upper management. An example may illustrate this better. Book selection and stock editing have long been considered sacrosanct by librarians, but it would be possible to produce a computer programme which would provide as balanced and user orientated a collection as that achieved by many librarians. This could be done be combining SDI profiles of booksellers information together with computer issue statistics identifying high use material and users' requests and thus provide a range of book orders.

Indeed, decision making in a general sense will be more and more influenced by the automation of procedures and the management information that derives from them. Advanced systems can not only control and produce information, but can manipulate it to eliminate human intervention in decision making. The middle manager could suffer the fate of the skilled craftsman before him.[18]

A more optimistic viewpoint is one that suggests that the librarian will be involved in not merely providing information but in editing, assessing and providing subject analytical and evaluative input.[19] A role that is not unknown in industrial or special libraries and has merit. Another possibility is that we may have an increasing task in educating the user in the appreciation and evaluation of information. But all these ideas beg the question as to whether our library staffs have the training or ability to perform them, especially taking into account the almost total dependency we have on IT. The lesson must be for the professional institutions, the library schools and ourselves to select and educate staff who will be capable of meeting these challenges.

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Letter to the editor

LIBRARY PERFORMANCE ASSESSMENT

Congratulations to Blaise Cronin on a most stimulating review[1] of the difficult area of library performance assessment.

In commenting on my own performance assessment attempts[2,3] he states that 'measurement in this area is necessarily imperfect, largely reliant on subjective assessment and the individual's recall and in addition difficult to carry out'.

Whilst not disagreeing with any of that, if it is accepted that libraries are in the communication business, then the user will need to be questioned in order to attempt to establish the effectiveness of the whole process. This is a highly subjective process (as are many of the other methods of performance evaluation involving the user which the author reviews), but with an effective interview schedule, and a good interviewer, the inaccuracy of the responses can hopefully be reduced. If, of course, like Lancaster,[4] the author believes that libraries are essentially in the publication supply business, then one can rely on more objective measures such as Orr's[5] document delivery assessment technique.

Individual recall did not appear to be a problem in my study because respondents were shown the actual documents that they had borrowed. It is difficult to prove that recall is good but respondents appeared to remember without difficulty, both the information need that prompted the use of the library and the part that the loaned publications played in meeting that need. I was however not attempting to measure or quantify at this stage of the study, but to make some attempt at qualitatively assessing the impact of the read publications.

Certainly the study was difficult to carry out and many mistakes were made en route. I still hold to my view however that the decision to invest in libraries is made on the basis that something favourable will frequently happen to the user as a result. If we are unable to demonstrate that this has actually happened, then the validity of that initial investment decision will be under constant attack.

John Blagden
Librarian, Cranfield Institute of Technology

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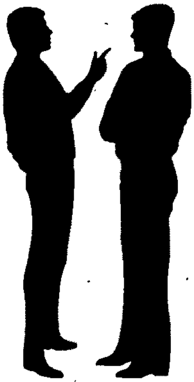

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